



CHEETAL

JOURNAL OF

The Wildlife Preservation Society of India

Vol. 38

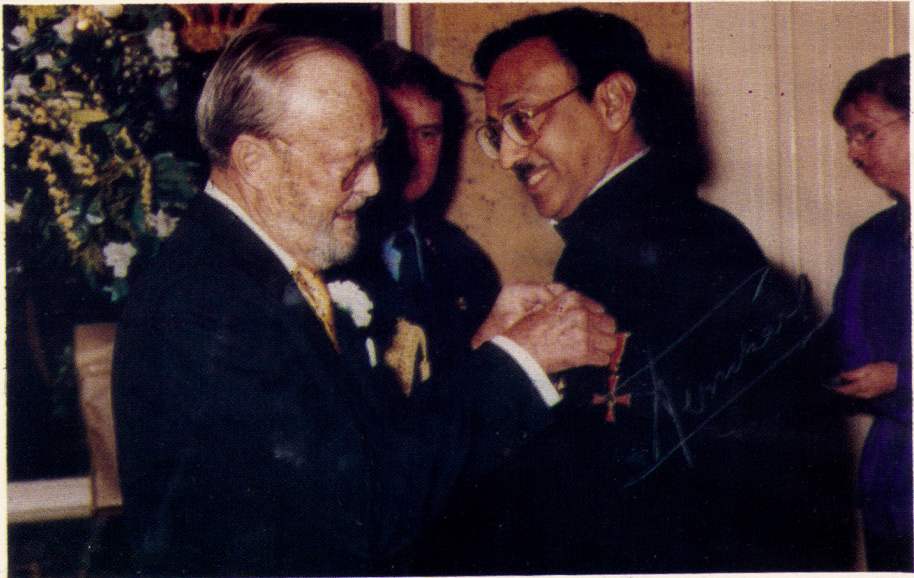
1999, Dehra Dun

No. 1 - 2



Bharat Natyam !
No, it is mating dance.

Grus Grus (Linnaeus)
Photo : Courtesy Sveriges Natur



PRINCE BEMHARD PINSTHE INSIGNIA OFTHE GOLDEN ARK ON DR. RANJIT BHARGAVA :
SOESTDIJK PALACE (NETHERLAND)
28.11.1998

The Order of the Goldern Ark is awarded to *Dr. Ranjit Bhargava* in recognition of his work to implement environmental laws, for the protection of fragile Himalayan ecosystems, and for the conservation of wildlife in Uttar Pradesh.

(*Bemhard*)

Prince of The Netherlands

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Editorial

AFTER the revival of the Wildlife Preservation Society of India in December, 1991 the first issue of "Cheetal", Vol. 31-No. 1 was brought out after a lapse of about four years. Since then it has been our earnest endeavour to improve the quality of 'Cheetal'. The last six issues Viz. Vol. 35 to 37 have been universally acclaimed.

But some of our readers showed concern over the deterioration in the quality of articles we have been publishing of late. They suggested that we should reproduce some of the good articles from the back issues of 'Cheetal'. Their valuable suggestions are welcome and have been taken care of. In fact we have already started reproducing articles from back issues, starting from Vol. 36 No. 1-2 onward.

But this is no solution. New educative and informative articles must pour in if 'Cheetal' has to survive. 'Cheetal' is a quarterly journal and we are supposed to publish four issues, one in each quarter. (April-June, July-September, October-December and January-March). But we are unable to do so and have to combine two issues for want of articles and other publishing material. We earnestly hope that our readers, who constitute a galaxy of scientists, wildlife experts, naturalists and environmentalists will listen to our call and freely contribute articles and make 'Cheetal' more interesting and informative journal.

Some of our readers, who regularly subscribed articles for 'Cheetal' in the past have abruptly stopped doing so. It seems they have patronised some other magazines. Although we cannot remunerate as much as other commercial magazines do, nevertheless, we shall be able to compensate the writers to the extent they spend in obtaining information and writing articles for 'Cheetal'. Moreover, we have now decided to reward the best three articles published in 'Cheetal' each year. We sincerely hope that a better response will be forthcoming from our readers.

DIVERSITY OF SHORE BIRDS AT DAHANU, DANDA AND SAVTA CREEKS IN WEST COAST OF INDIA

By

J.P. Kotangale* and T.K. Ghosh*

Abstract

The diversity of avifauna around Dahanu creek region in west coast of India was critically studied during post-monsoon 1991 and winter 1991-92. A total of 17 varieties of aquatic and semi-aquatic birds were encountered during the survey, of which 14 species were waders. Little stint, followed by blackheaded gull and Indian reef heron was found to be the most dominant species during both the seasons. Amongst 12 types of food items normally preferred by the encountered birds, majority of them were piscivorous in habit (23.10%). However, garbage and kitchen scraps were least preferred (1.63%) by the avifauna. Amongst the 17 species of birds, 4 were migratory and winter visitors while others were residents or resident migratory. In view of ample availability of preferred food items during post-monsoon season, migration of curlew, little stint and blackheaded gull seemed to have been advanced in Dahanu creek region.

Introduction

Shore birds are aquatic or semi-aquatic in habit, frequently visiting the banks and shores of rivers, lakes, estuaries seas etc. While semi-aquatic birds, being mostly carnivorous in habit, visit the shores for foods, aquatic birds remain in the muddy or marshy shore areas and get the food by probing in the mud. Biomonitoring of sea birds in recent years has got tremendous importance because of their ability to accumulate heavy metals, pesticides etc. thereby affecting biodiversity (Furness 1984).

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The site of Dahanu Thermal Power Station is surrounded by Dahanu, Danda and Savta creeks on three sides (Fig. 1) and western mainline on the east. It is accessible from National Highway No. 8 at Charoti, which is 80 kms from northern limit of Mumbai city. The main creek branches into a smaller Savta creek and a larger Danda creek. The depth at the centre of the main creek near the station is around 4-5 metres during low tide. The Danda creek terminates near Kampada village, 1.5 kms from the site towards east. The two arms of the Danda creek extend 2-3 kms and terminate towards south. Other branch, namely Savta creek, is itself a small river, which originates from Santoshi hills about 10 kms east of the site. Except for the monsoon season, it does not get fresh water run-off. In the dry season, sea water in Savta creek extends about 1.5-2.0 kms inside

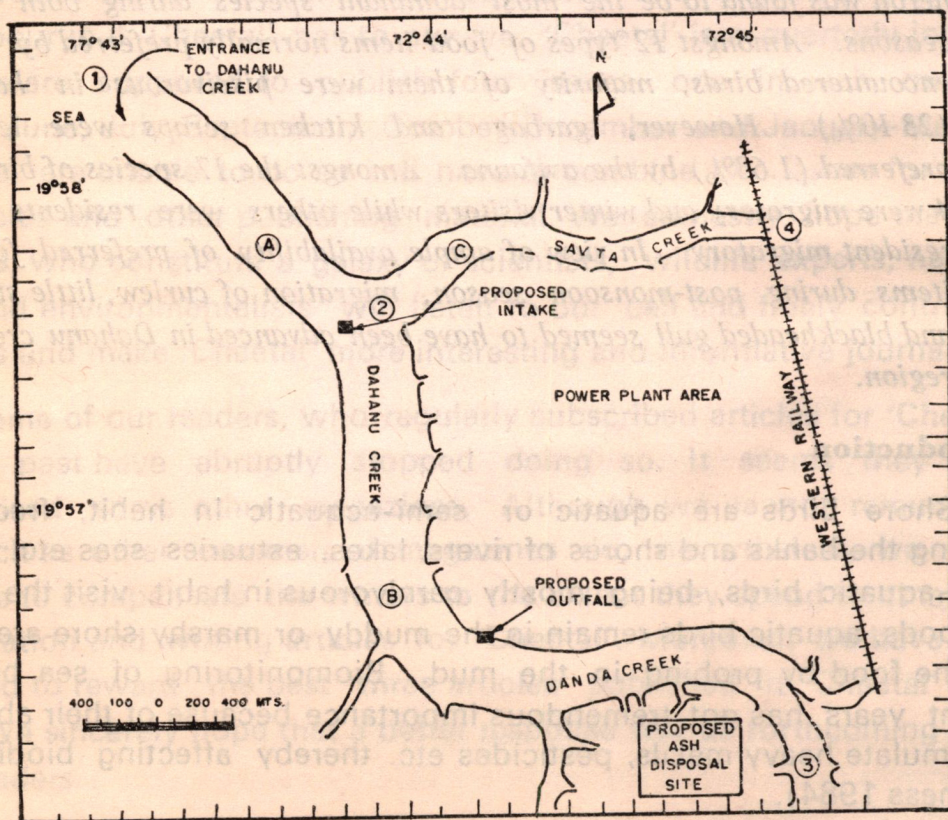


Fig. 1. Location of Dahanu Thermal Power Station and sampling sites for Survey of Avifauna

during high tide. The tide variation between low tide and high tide is about 5 m and the depth of sea at the mouth of the creek is 2-3 m during low tide. While the soil of Dahanu creek near open sea is sandy in nature, it is clayey at most of the areas of the three creeks including banks. The site is situated predominantly in barren land having very few salt pans and surrounded by sparsely populated region with very little cultivation.

Fishing is the main source of income of the local people residing on the banks of the creeks. While discarded fishes and other aquatic fauna attract a large number of birds, no systematic studies on avifauna of this region had earlier been reported. In view of construction of a 500 MW coal based thermal power station in this region, and its anticipated impact on surrounding environment, a detailed study towards biodiversity, census and feeding habit of the aquatic and semi-aquatic birds around the creeks was undertaken prior to commissioning of the power plant, and the major findings are delineated in the present communication.

Materials and Methods

Field observations of shore birds were carried out around Dahanu creek area during high tide and low tide in post-monsoon 1991 and winter 1991-92. The counts of the birds were undertaken following standard procedures (Clarke 1986, Richter & Sondgerath 1990) by travelling the whole creek area along the shore by fishing boat. The birds were studied by direct observations with the help of 8×30 'Super Zenith' binocular and were identified by adopting available literature (Ali 1988, Ali & Ripley 1983, Woodcock 1988). A species list was prepared by noting taxonomic position of each species encountered, relative abundance and absolute number in each specific area. The creek was divided into three following regions for the present study.

Region A - area between stations 1 and 2

Region B - area between stations 2 and 3

Region C - area between stations 2 and 4

The data were subjected to detailed analysis and the following indices were applied.

- a) Dominance Index (D)

$$D = (n_i/N) \times 100$$

- b) Census Index (C)

$$C = n_i/M$$

- c) Species Richness Index

It is expressed as total number of species recorded at each region.

- d) Species Diversity Index (d) (Margalef 1951)

$$d = (S-1) / 1n N$$

where,

n_i = counts of individual species recorded

N = total counts of all species

M = area in km^2 covered at each region

S = total number of species recorded

Feeding habits of the birds were assessed following preference of food items as recorded by Ali and Ripley (1987). Altogether 12 groups of food items, preferred by the observed avifauna, were demarcated from the literature. Depending on the feeding habit, each species of bird was placed in respective group. While a species opting two or more groups of food items, due weightage was given to each type of food, and percentage of birds depending on different food items have been derived (Kotangale & Ghose 1997). Further, correlations between migratory behaviour of the birds and their feeding habits were critically assessed.

Results and Discussion

Altogether 17 species of birds were encountered during the present survey, of which 14 species were the waterbirds, mostly possessing wading habit. Little stint was found to be the most dominant species during both the seasons followed by blackheaded gull and Indian reef heron. Species richness index of the whole region was estimated as 14 and 13 during post-monsoon and winter seasons respectively

Table 1

Availability of Shore Birds Around Dahanu, Danda and Savta Creeks

Sr. No.	Common name	Scientific name	Season	Region A		Region B		Region C	
				Percent dominance	Census index	Percent dominance	Census index	Percent dominance	Census index
1.	Little cormorant	<i>Phalacrocorax niger</i>	PM	—	—	0.35	0.51	—	—
			W	1.76	2.31	1.87	1.01	—	—
2.	Grey heron	<i>Ardea cinerea</i>	PM	—	—	0.35	0.51	—	—
			W	—	—	0.93	0.51	—	—
3.	Pond heron	<i>Ardeola grayii</i>	PM	2.76	5.38	0.35	0.51	5.62	5.76
			W	1.76	2.31	6.54	3.54	1.00	1.15
4.	Large egret	<i>Ardea alba</i>	PM	3.15	6.15	0.70	1.01	2.25	2.31
			W	0.59	0.77	0.93	0.51	1.00	1.15
5.	Little egret	<i>Egretta garzetta</i>	PM	—	—	0.70	1.01	—	—
			W	1.18	1.54	—	—	—	—
6.	Indian reef heron	<i>Egretta gularis</i>	PM	19.69	38.46	4.88	7.07	74.16	76.08
			W	20.00	26.15	14.02	7.58	21.00	24.21
7.	White ibis	<i>Threskiornis aethiopica</i>	W	3.53	4.62	0.93	0.51	—	—

Cont.

8.	Domestic duck	Anas platyrhynchos domesticus	PM	5.90	11.54	—	—	—	—
			W	2.94	3.85	—	—	—	—
9.	Pariah kite	Milvus migrans	PM	—	—	0.70	1.01	—	—
10.	Greater spotted eagle	Aquila clanga	PM	0.79	1.54	—	—	—	—
11.	White bellied sea eagle	Haliaeetus Leucogaster	PM	0.79	1.54	—	—	—	—
12.	Curlew	Numenius arquata	PM	—	—	0.70	1.01	4.49	4.61
			W	—	—	2.80	1.52	—	—
13.	Little stint	Calidris minuta	PM	2.36	4.62	71.77	104.04	13.48	13.83
			W	20.59	26.92	56.08	30.30	67.00	77.23
14.	Avocet	Recurvirostra avosetta	PM	4.72	9.23	2.78	4.04	—	—
15.	Herring gull	Larus argentatus	W	0.59	0.77	—	—	—	—
16.	Blackheaded gull	Larus ridibundus	PM	59.84	116.92	16.72	24.24	—	—
			W	47.06	61.54	—	—	10.00	11.53
17.	Slender billed gull	Larus genei	W	—	—	15.90	8.59	—	—

(Table 1). While considering three different regions of the creeks, region B was found to be very rich during post-monsoon with species richness index of 11 and species diversity index of 1.77. However, during winter season, region A was more diverse than the other two regions, exhibiting species richness and species diversity index values as 10 and 1.75 respectively (Table 2). It may be mentioned that harvested fishes which normally land only in southern bank of region A of Dahanu creek, were maximum during post-monsoon season. Altogether 81 and 12 species of fish and prawn respectively were recorded in the creeks, of which *Horpodon nehereus* was most dominant in summer and post-monsoon seasons and *Lepturacanthus savala* outnumbered other fishes during winter season (Neeri 1993). A sizable portion of these fishes are sundried on creek banks. In view of smaller size, *H. nehereus* and mudskippers are preferred by predator birds. Higher diversity of avifauna in region B might be attributed to shallowness of the banks, muddy bottom and availability of ample food in the form of mudskippers, molluscs, worms etc.

Feeding habits of the birds were also correlated with their migratory behaviour. Out of 17 varieties of birds recorded in the study

Table 2

Dominance and Diversity of Common Shore Birds around Dahanu,
Danda and Savta Creeks

Creek area	Seasons	Diversity Index	Species richness	Most dominant species	Dominance index	Total density (count)
A	Post monsoon	1.45	9	Black-headed gull	59.84	254
	Winter	1.75	10	Black-headed gull	47.06	170
B	Post monsoon	1.77	11	Little stint	71.77	287
	Winter	1.74	9	Little stint	56.08	107
C	Post monsoon	0.89	5	Indian reef heron	74.16	89
	Winter	0.86	5	Little stint	67.00	100

A : Between stations 1 & 2;

B : Between stations 2 & 3;

C : Between stations 2 & 4

area, a few namely, curlew, little stint, herring gull and blackheaded gull are migratory and normally winter visitors, whereas the remaining species are residents or resident migratory (Ali 1988, Ali and Ripley 1988). These migratory birds are carnivorous preferring molluscs, crustaceans, insect larvae, worms, crabs etc. Additionally, herring gull and blackheaded gull are scavengers feeding on fish offal and other refuse. In view of availability of ample preferred food during post-monsoon season, migration of curlew, little stint and blackheaded gull might have been advanced and these were encountered both in post-monsoon and winter seasons. However, herring gull was recorded only in winter season.

The species of birds recorded from the study area were grouped on the basis of their feeding habits. Altogether 12 groups of foods were preferred by the birds in the study area. It has been observed that the majority of the birds (23.10%) were piscivorous in habit. While crustaceans were next (17.55%) preferable food item followed by insects and worms (13.05%), molluscs (11.26%) and frogs (10.79%); garbage and kitchen scraps were least (1.63%) preferred by the avifauna (Fig. 2). Although the majority of terrestrial birds are usually insectivorous in habit (Ali and Ripley 1987) it is unlikely to be preferable item for those in aquatic habitat, as found in the present study. Kotangale and Ghosh (1997) also observed the majority of terrestrial birds as the insectivores (40.78%) in Rawatbhata region, Rajasthan.

The Dahanu creek area is very rich in zooplankton, grouped under 21 major taxa with dominance of copepoda (Kotangale *et al.* 1994). While benthic macrofauna is represented mostly by bivalves, hermit crabs, gastropods and polychaetes, nematodes outnumber other groups in the meiobenthos (Kotangale and Ghosh 1996). Besides fish, these organisms are used as food of inhabited birds. Further, the area is having the mangrove vegetation along the coastline and becomes economically important in terms of their direct resource utilization potential for forestry and fishery production; and in terms of their indirect potential as protecting coastlines, thereby maintaining

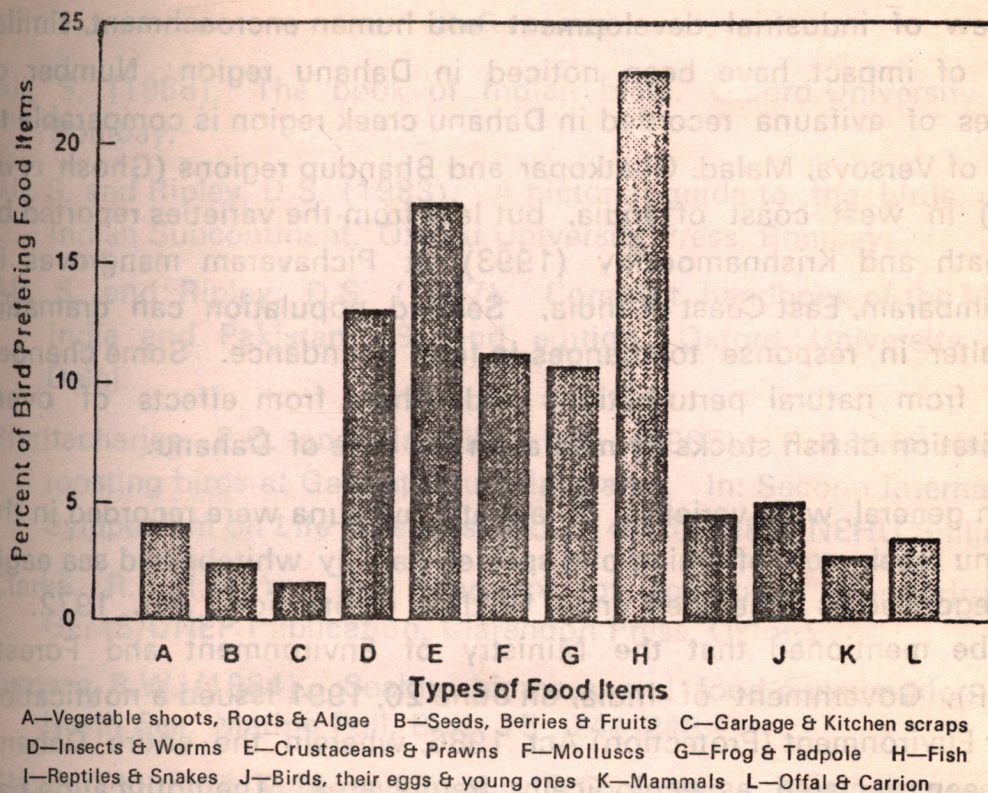


Fig. 2. Preference of Food Items by Avifauna Recorded in Dahanu Creek, West Cyst of India.

ecological balance (Tomlinson 1982). Altogether 7 varieties of mangroves were recorded from the creek area, of which *Avicennia marina* and *Aeluropus* sp. were present in all the zones under study (Ghosh *et al.* 1996). In order to improve the ecology of the region the authority of thermal power plant undertook mangrove plantation scheme right from the construction phase.

The birds, like other animals, also get affected by environmental pollution and, therefore, serve as bioindicators. Indiscriminate cutting of trees and human disturbance often reduce the roosting sites of birds which are helpful for public health as they are acting as scavengers (Bhattacharjee and Hazarika 1985, Sandhu and Dang 1980).

In view of industrial development and human encroachment, similar types of impact have been noticed in Dahanu region. Number of species of avifauna recorded in Dahanu creek region is comparable to those of Versova, Malad, Ghatkopar and Bhandup regions (Ghosh *et al.* 1994) in west coast of India, but less from the varieties reported by Sampath and Krishnamoorthy (1993) at Pichavaram mangroves in Chidambaram, East Coast of India. Seabird population can dramatically alter in response to changes in food abundance. Some changes result from natural perturbations and others from effects of over-exploitation of fish stocks by man as in the case of Dahanu.

In general, wide varieties of aquatic avifauna were recorded in the Dahanu creek area; of which one species namely whitebellied sea eagle is categorised as Schedule I under Wildlife (Protection) Act, 1972. It may be mentioned that the Ministry of Environment and Forests (MoEF), Government of India, on June 20, 1991 issued a notification under Environment (Protection) Act, 1986, wherein the entire Dahanu has been declared as ecologically fragile area. The notification has categorically taken cognisance of entire lands fronting on sea and creeks. In view of different anthropogenic activities in the area, diversity of the birds may get affected. Environmental guidelines stipulated by MoEF should strictly be adhered to by the existing industries, specially the Thermal Power Station, so as to preserve the ecology of the creeks. The data on avifauna generated during present investigation will be useful to compare any deviation of the same in future due to anthropogenic activities.

Acknowledgement

The authors express their sincere sense of gratitude to Director (Tech), BSES Ltd., Mumbai and Director, Neeri, Nagpur for providing all sorts of facilities and cooperation during the course of investigation.

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THE GREAT INDIAN ONE-HORNED RHINOCEROS (*RHINOCEROS UNICORNIS*) WITH SPECIAL REFERENCE TO ITS MAIN SANCTUARY, KAZIRANGA, IN ASSAM*

By

Richard Waller

There are five species of rhinoceros still in existence. Two of these are found in Africa and three in Asia; of the three in Asia only the Indian One-Horned Rhinoceros holds out any real hope of being preserved for future generations. The other two are the Javan One-Horned and the Sumatran Two-Horned, both of which are down to 20-50 individuals at the most,

The present status of the Great Indian One-Horned Rhinoceros is also that of an endangered species, and is entered as such in the 'Red Book' of the I.U.C.N. Its numbers are estimated at about 805 in all, and these concentrated in a limited area along the base of the Himalayan foothills from the Nepal terai in the west, through the north of West Bengal into Assam in the east.

The situation in Nepal is depressing as regards present numbers, but very hopeful in recent conservation legislation. In 1964 the estimate was 185 (E.P. Gee-Wildlife of India): in 1966 it was 100 or less (J. Spillett—Bombay Natural History Society Journal Vol. 63.3); but it is doubtful if more than 80 now remain—all in the Royal Chitawan National Park. The hopeful aspect is that Chitawan has recently been declared a National Park.

50,000 to 80,000 villagers live on the borders of the Park and upto recently, grazed many thousands of cattle within the Park whose rhino habitat has now been virtually destroyed, with the exception of the 150 acres around 'Tiger Tops'. This area has been leased to the company for 15 years by the Govt. of Nepal and the company protects it carefully so that their many foreign clients may see rhino. In 1970, and I quote from my own notes of two years ago, "The numbers of

*Reproduced from from 'Cheetal' Vol. 15, No. 1 (June 1972).

rhino are steadily diminishing and the last vestiges of habitat are being inexorably destroyed by the thousands of cattle and buffalo which over-run Chitawan."

However, events have been moving most hopefully there during the last year. The Govt., with the full backing of the King, allocated funds for the demarcation, re-habilitation and protection of Chitawan. The demarcation has been done, and it has been declared the Royal Chitawan National Park. The efficiency of protection against poaching increases monthly. Villages will be moved, where necessary, and alternative grazing will be found for the cattle and domestic buffalo. These are excellent steps, thanks to the interest of the former King of Nepal and his son, the present King, together with the keenness and persistence of John Blower, the U.N. Wildlife Adviser: and if continued with zeal, should ensure the existence of the rhino and the steady build-up of its numbers as its favourite habitat is gradually restored in the Royal Chitawan National Park.

In India, where this species of rhino is now confined to Assam and the north of west Bengal, its history over the last 65 years, in spite of various set-backs, is a triumph of wildlife conservation and efficient protection, especially in the famous Kaziranga Sanctuary in Assam. Early moves were made in the days of the British in India when, in 1906, the wife of the Chief Commissioner of Assam was most disappointed at failing to see rhino in this area after a day's search on an elephant. Reading the records of the earliest Kaziranga Reserve, her failure was not surprising as the numbers of rhino were estimated at about 40 and some put them as low as 20. The British Tea Planters had slaughtered nearly the lot. Luckily for the world, the Chief Commissioner's wife was a forceful lady and brought such pressure to bear on her husband that he ordered the formulation of the Kaziranga Reserve in 1907 and, with a fine disregard for the tea planters of his day, made the first step in saving this species of rhino from extinction.

Kaziranga went through bad times after World War II when poaching for rhino horn was at its height and the very people who were supposed to be protecting the rhino were in league with the poachers and shared their profits. In the early fifties there was a clean-up, followed by the excellent partnership of P.D. Stracy at the top as Chief Conservator, E.P. Gee at hand to advise and R.C. Das running the sanctuary. This combination firmly established Kaziranga as the best sanctuary for rhino, by controlling poaching and greatly increasing the numbers of all animals. India was lucky to have such men available at the time to ensure the future of the rhino and Kaziranga. It still has them, and the present staff, overall, is the keenest and more dedicated I have come across in India.

Further success has continued in the rehabilitation of the rhino since E.P. Gee (*Wildlife of India* 1964) estimated 440 for India (Assam 375 and West Bengal 65). The figure for India is now about 725, of which Kaziranga has 600+, Manas 40 with about 20 in other small reserves; while West Bengal has 65, mainly in Jaldapara and a few in Gorumara.

In 1966, Spillett (*Spillett B.N.H.S.* 1966) estimated 580 for India. There has been a decrease in certain areas due to heavy poaching for rhino horn in the small poorly protected reserves in Assam as well as outside these reserves, for which he estimated 70 and 40 respectively; of these rhinos very few remain. On the other hand, numbers in the well-protected sanctuaries have risen since 1966:—Jaldapara and Gorumara from 50 to 65, Manas 15 to 40 while Kaziranga recorded a marked increase from 400 in 1966 to over 600 in March 1972. This figure is not yet official and is being re-checked; it may well be 650. From these figures we can see clearly the effect of good administration and protection, and vice versa. There is absolutely no alternative when it comes to saving a species but the right men determined to do a good job.

The estimated status in 1972 of the numbers of Great Indian One Horned Rhinoceros can be given :—

Assam: India)	Kaziranga Sanctuary	600+	} 660
	Manas Sanctuary	40	
	Small sanctuaries with little or no protection	20	
West Bengal: (India)	Jaldapara	60	} 65
	Gorumara	5	
Nepal:	Chitawan	80	
		805	

Kaziranga Sanctuary in Assam is undoubtedly the best place for viewing this species of rhino, with Jaldapara in West Bengal a good second. In view of the importance of Kaziranga both from the rhino point of view and from good tourist facilities for viewing it and other animals, I think it is worth while giving a description of the sanctuary and some of my experiences there, during 1970 and 1972.

Its area is 430 sq. kms. (166 sq. miles), less about 38 sq. kms. (15 sq. miles) lost by erosion along the Brahmaputra river since 1950. It will shortly be increased by 30 sq. kms. (12 sq. miles) of the Mikir Hills to allow for protection of migrating elephant and hog deer.

The habitat is essentially riverine on the Brahmaputra flood plain. It consists of four main types:—

- (1) Open grassland or maidan with 70 to 200 cm. (2 to 6 ft.) high grass (*Erianthus* and *Saccharum* species), already partly flooded in the second half of May by early premonsoon rain. This is the main area for swamp and hog deer.
- (2) Tall grass and reeds (*Arundo donax* and *Phragmites* sp.) often over 4 m. (13 ft.) high and bordering:—
- (3) The many small lakes or 'bils' with interconnecting streams.

(4) Islands, usually just above flood level, covered with fairly open tropical semi-evergreen forest (*Bombax ceiba*, *Albizzia* and *Lagerstroemia* species are dominant). Annual rainfall is 2,000 mm. (80").

Just as the first area, when dry or not too deeply flooded, is the favourite habitat of swamp and hog deer, with sambar largely confined to the forested islands, so the second and third areas are the ones in which rhino and wild buffalo are certain to be seen. Part of the grass-land area is burnt each year in January and February and the quickly growing new shoots attract the herbivores. The annual flooding is destructive in its erosion of the northern boundary, but beneficial in so far as it appears to be the only check on the insidious water hyacinth (*Eichhornia crassipes*) which covers parts of the lakes and water courses. Attempts are being made to rake this off the 'bils' by elephant or other power. The flood waters also irrigate the maidans and re-stock the lakes with fish for the numerous otters and water birds.

The following species and numbers were given based on a census done on the block system in March 1972:—

Rhino	600+ (though 650 were actually counted)
Wild Buffalo	550
Elephant	450
Swamp Deer	520
Sambar	200+
Hog Deer	4,500+
Tiger	7 sighted (probably about 20)

Of other species, pig and otter were common, both the black bears and barking deer are occasionally seen, while leopard and gaur are rare.

This well known sanctuary is rightly famous for its rhino and wild buffalo (*Bubalus bubalis*). The populations of both species appear to be in a healthy state with a good female: young ratio (178 cow rhino had calves in the recent census). Considering the area of Kaziranga and the difficulty of any extensive enlargement southwards into the Mikir Hills, it is quite possible that the present figures for these two species

represent the maximum that can be carried, and they should not be allowed to increase further, though range conditions do appear to be good. A careful study is needed, as social conditions could be aggravated with consequent fighting for territorial space.

There is, of course, the ever present danger of poaching for the rhino's horn, and killings do still occur as the poachers are professionals. They come in by night, lie up till dawn when they shoot a rhino or sometimes kill in a previously prepared pit, lie up again till night fall and then escape with their spoil. More regular patrols, in small groups and armed, since the poachers will fight, and equipped with two-way radio sets could almost eliminate rhino poaching. The present Divisional Forest Officer, who has a real love and knowledge of the sanctuary, takes the poaching hazard very seriously and is doing an excellent job, well backed by his Range Officer, Forest Guards and Game Watchers as well as fifty special armed Guards. There are 23 permanent guard camps in and on the edge of the sanctuary, with at least 3 men in each. Between all camps, lines are re-cut after the monsoon, in October, to facilitate movement of anti-poaching patrols as well as observation of animals. In certain cases where the terrain is very difficult, one or two elephants (normally for tourist use) will be sent out for a period to patrol a particular area. There is a patrolling staff of about 80 (mostly Forest Guards and Game Watchers) assisted by 50 armed Home Guards; the latter are expressly for use against the gangs of professional armed poachers. Rewards are paid to guards involved in fights with poachers: Rs. 200 to each guard directly involved in countering a poaching attempt, and between Rs. 50 and Rs. 80 to staff not directly involved but who helped in the operation.

I continue on a more personal note to give an idea of the richness of Kaziranga. We spent several evenings at a certain bridge over a water course in the Kaziranga block about 4 kms. into the sanctuary. From here, just before and after sunset, the wealth of this sanctuary's wildlife could be fully realised. There were never less than five rhino, either partly submerged in water or grazing on the banks, within 60 metres of us, and one evening there were eight. To one side and

beyond the tall reeds, where the swamp partridges (*Francolinus gularis*) were calling, stretched the open grasslands where swamp deer stags were grazing in the late sunlight and numerous hog deer were just discernible in the swaying grass. The whistle of an otter then drew our attention to the water below and there was a pair swimming past, their heads above the water. One of them, nearing the bank, stood on his hind legs and looked at us before they both dived off at speed, leaving lines of bubbles on the surface. On the silk-cotton tree (*Bombax ceiba*) above us, were two pelicans and five open-bill storks and, in the reed bed below, two purple herons, a large egret and a black bittern. (*Dupetor flavicollis*), while a few minutes later a chestnut bittern (*Ixobrychus cinnamomeus*) flew in, his rich cinnamon colour as if lit from inside in the last rays of the sunset. Before the sun finally left us that evening the head of a swimming body was seen moving across a stretch of open water only about 50 m. away; we thought at first it was a large otter, but as we looked more carefully the creature swam into sunlit water and we could see the separate scales on the head of the fine monitor lizard.

Another evening in a nearby 'bil' I watched three rhino apparently cropping the underwater grass, recently flooded. All three were below the surface, showing only the horn and two ears clearly. Every minute or so, one or other of the rhino would submerge completely, disappearing from view for about 10 seconds and then re-surface with bits of mud and grass dropping from its lips. They must have been just in their depth most of the time, at nearly 2 m. of water, but now and again one of them would clearly swim in order to take up a fresh position on the bottom of the 'bil'.

Once I watched a bull rhino at close quarters alternately cropping grass and then water hyacinth. If only more of them would take to eating this insidious weed, it might not be such a menace !

It is unwise to walk much in highly populated rhino country unless one has a following domestic elephant. Rhino are not aggressive unless with calf, only curious to explore a certain smell or noise. Such a human smell must have agitated the two that came snorting and

crashing towards me through the tall grass one afternoon. Luckily I heard them sufficiently far off to be able to reach a convenient tree which I went up like a monkey. They then came up to the tree and one even appeared to look upwards to my precarious position on a low branch; afterwards, wheeling off, they made a circle through the reeds returning with snorts to the same tree. This was repeated yet again and made me so nervous I couldn't hold my camera still! Presumably they got my wind again each time they withdrew and this stimulated another sally. So, on the third circle when they reached the further point, I came down and ran the fastest half mile of my life to a waiting jeep.

There is much evidence of animals feeling a sense of security in a sanctuary. Recently an old bull rhino, sensing his end, came deliberately near a guard post on the edge of the park. The guards even fed and watered him for three days where he lay before he died.

Kaziranga has a great future and, by reason of its habitat and species, can combine most happily, wildlife orientation and development with tourist attractions. Animals can be seen easily and comfortably in their natural surroundings and although the sanctuary itself is flat, the backdrop of the snow-covered peaks of the Himalayas in the cold season, gives it a fabulous setting.

I hope to have given some idea of this magnificent sanctuary whose staff is doing such a fine job in protecting the Great Indian One-Horned Rhinoceros. They look after their tourists equally well and I strongly recommend a visit to any who can get to India.

STATUS OF FAUNA IN PROTECTED AREAS OF MADHYA PRADESH THE CASE STUDIES OF STAPUDA, BANDHAVGARH, INDRAVATI AND MADHAV NATIONAL PARKS

By

R.B.S. Kushwah* and V. Kumar**

Abstract

The term 'biological diversity' or the short term 'biodiversity' is a synonym for the variety and variability of all life on this earth. It includes diversity within species, between species and of ecosystems. Classification is an essential process in our daily lives and a necessary tool for our survival. It is hard to define biodiversity in mathematical terms. So 'biodiversity indices' are used for this purpose. The Shannon Wiener biodiversity index, based on the proportional abundance of the species, provide an alternative approach to the measurement of biodiversity. Attempt has been made for the first time in the State of Madhya Pradesh to work out the biodiversity indices for fauna in the four PAs, i.e., the Bandhavgarh (BNP), Indravati (INP), Mahav (MNP) and Satpuda (SNP) national parks of Madhya Pradesh following standard sampling techniques and formulae. The values of Shannon-Wiener biodiversity indices were computed and found to be 1.998, 1.963, 1.651 and 1.631 respectively for SNP, INP, MNP and BNP. The values of the index of evenness have also been computed and found to be 0.634, 0.626, 0.534 and 0.520 631 respectively for SNP, INP, MNP and BNP. The above faunal diversity has been supplemented by studying the RDB status and abundance of the faunal species in the PA with the help of secondary and primary information. Secondary information was taken from the data bank of Wildlife Institute of India (WII), Dehra Dun which was further confirmed by the observations in the field (i.e., the primary data). This study is not only of academic interest, but also relevant for PAs managers.

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Key-Words

Protected Areas (PAs), Shannon-Wiener biodiversity index, Point-centred Quadrant (PCQ) method, index of evenness, proportional abundance, Red Data Book (RDB) status.

Introduction

Diversity can be determined by the number of species per unit area or volume. It contains (a) that of richness or number of species, and (b) that of richness of distribution of the individuals within each species. The term 'Biodiversity'—a synonym for the variety and variability of all life on this earth, represents the very foundation of human existence. By our heedless actions we are eroding this biological capital at an alarming rate. Besides the profound ethical and aesthetic implications, it is clear that the loss of biodiversity has serious economic, environmental and social costs. The genes, species, ecosystems and human knowledge systems which are being lost represent a living library of options available for adopting to local and global change. Biodiversity is part of our daily lives and livelihoods and constitute the resources upon which families, communities, nations and future generations depend (Elizabeth Dowdeswell, UNEP, 1995).

Classification is an essential process in our daily lives and a necessary tool for our survival (Heywood and Baste, 1995). For example, we need to know which plants, animals, fungi are useful and which are poisonous or dangerous, *Biological diversity (or in concise from 'biodiversity') means the variability among living organism from all sources, including, inter alias, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, this includes diversity within species, between species and of ecosystems* (Rio Convention, 1992). Thus biodiversity means the variability among living organisms from all sources and the ecological systems of which they are a part, this includes diversity within species, between species and of ecosystems (Bisby, 1995). Humans depend on biological resources for food energy, construction materials, medicine, inspiration and much else besides. Further, biological resources have the critical character of

being renewable, so with proper management they can be used sustainably (Mc Neely *et al.*, 1995), ensuring their use for our future generations.

India is very rich in biodiversity at ecosystems and species level and ranks sixth among 12 mega-diversity in the world and holds two biodiversity hot spots. Out of 1.7 million globally described species, India possesses 49,219 species of flora and 81,251 species of fauna which represents about 7 percent of the world species (Kotwal, 1997). The Central Indian State, of **Madhya Pradesh** possesses about 2,400 species of plants, 50 species of mammals and 600 species of birds in the state, including several endemic and endangered species (Mishra, 1995).

Study Area

All the Protected Areas taken up for the present study are located in the state of Madhya Pradesh, India. The Bandhavgarh, Madhav, Indravati and Satpura National Parks have been selected randomly representing one unit from each biogeographic zone/province.

Physical Features

The *Bandhavgarh National Park* (BNP) is located in Shahdol and Jabalpur districts, at latitude 23 30°N and longitude 80 58°E, with the area of 437 km². It was established on 11.05.82 as per the legal provisions of the wildlife act, 1972. The *Indravati National Park* (INP) is located in Bastar district, latitude between 18.51° to 21.19° N and longitude between 80.16° to 80.44°E, with the total area of 1258 km². Both of these national parks also possess the special category of "Tiger Reserves", established by the GOI under the Project Tiger, India. The *Madhav National Park* (MNP) located in Shivpuri district, latitude between 24.80° to 25.55° N and longitude 77.20° and 78.50° E, with the area 337 km². The *Satpura national park* (BNP) located in Hoshangabad district, latitude between 21.19° to 22.40° N and longitude 77.57° to 78.34° E, with the area of 524 km² (WII data base, 1995).

Biogeographic Features and Biodiversity Values

The BNP and SNP are situated in the Central highland biogeographic zone. The BNP comes under the province of Vindhya-Baghel Khand and the SNP in the Satpura-Maikhal. The INP is situated in the Eastern highland zone and the MNP in the semi-arid zone. The major biomass are tropical dry and moist deciduous, tropical secondary scrub forests in the PAs under study. The vegetation status of INP is vulnerable and of BNP, MNP and SNP is endangered.

The biodiversity values for BNP and INP are high species diversity, regional connectivity large predator prey system for MNP the biodiversity values consists of moderate species diversity and for SNP these are high species diversity and regional connectivity.

Methodology

The secondary data has been collected from the relevant records, whereas the primary data has been collected from the field works using pre-tested questionnaires/ interviews/ observations/ mensuration. The samples were selected using PPS sampling method. The size of the sample depend on the size of the population. The size of the quadrant has been decided at field after using the concept of minimal areas of species areas curves.

The modified PCQ (Point Central Quadrant) method (Kushwah, 1996) was used in order to assess the faunal status in addition to the traditional 'census methods'. In this method, from the baseline perpendicular transact-line was laid out and the sample points were selected at the interval of 50 metres (practically 50 paces). From each sample point, the four quadrants were obtained by dividing the transact-line perpendicularly and the distance of the nearest tree from the center point (D) in each quadrant was measured (in metres) along with the other phenological details of the floral species. The area of 50 m x 25 m on both sides of the transact-line in each quadrant was observed for the faunal signages (e.g., scats, dropping, digging, etc.) in addition to the actual sighting of the species.

Non-availability of past data especially of the period when the forests were declared as PAs, has become an obstacle in calculating the initial biodiversity indices; hence, a comparison could not be done with the present biodiversity indices. The present biodiversity index has been calculated with a view to assess the present status of fauna in the PAs under study. For this, the Shannon-Wiener biodiversity index (H') has been calculated. The details of this index and the method of computation are summarized in *Box-1*.

Box-1

The details of Shannon-Wiener Biodiversity index

The Shannon Wiener biodiversity index, based on the proportional abundance of the species, provide an alternative approach to the measurement of biodiversity. It is one of the information theory index, based on the rationale that the diversity, or information, in a natural system can be measured in a similar way to the information contained in code or message. This index assumes that individuals are randomly sampled from an indefinitely large (that is an effectively infinite) population (Pielou, 1971). The index also assumes that all species are represented in the sample. It is computed from the equation :

$$H' = -\sum p_i \ln_e p_i$$

(which p_i = the proportional of individuals found in the ' p_{th} ' species)

The formula for the Shannon index commences with minus sign to cancel out the negative created by taking logs of proportions. In a sample the true value of p_i is unknown, but estimated as n_i/N (the maximum likelihood estimator) (Pielou, 1969). Use of n_i/N as an estimate of p_i produces a biased result and strictly speaking the index should be obtained from the series (Hutcheson, 1970; Browman *et al.*, 1971) :

$$H' = -\sum p_i \ln_e p_i - (S - 1)/N + 1 - 1/p_1 / 12N^2 + [12N^2 (1 - 1/p_1)^2 / 12N^2]$$

In practice, however, this error is rarely significant (Peet, 1974) and all terms in the series after the second are very small indeed. A more substantial source of error comes from a failure to include all species from the community in the sample which increases as the proportion of species represented in the sample declines. The value of Shannon-Wiener diversity index usually vary between 1.5 to 3.5 and only rarely surpasses 4.5 (Margalef, 1972). About one lakh species will be needed to produce a value of $H' > 5.0$. The index measures concentration of dominance of species in the study area.

The variance in diversity of two samples may be estimated using the formula :

$$\text{Var } H' = [p_1 (\ln_e p_1)^2 - (p_1 \ln_e p_1)^2] / N - (S - 1) / 2N^2$$

A **t-test** allows the diversities of two samples to be compared. The appropriate formula is:

$$t = (H_1 - H_2) / (\text{Var } H_1 - \text{Var } H_2)^{1/2}$$

The required degree of freedom must also be calculated, using the formula :

$$df = (\text{Var } H_1 - \text{Var } H_2)^2 / [(\text{Var } H_1)^2 / N_1 + (\text{Var } H_2)^2 / N_2]$$

Although as a heterogeneity measure Shannon's index into account the evenness of the abundance of species (Peet, 1974), it is possible to calculate a separate additional measure of evenness. The maximum diversity ($H'_{\max}$) which could possibly occur would be found in a situation where all species were equally abundant. In other words, if $H' = H'_{\max} = H' / \ln_e S$. The ratio of observed diversity can, therefore, be taken as a measure of evenness (earth's vitality and diversity) (Pielou, 1974). $E = H'_{\max} / H' = H' / \ln_e S$

The maximum value of E is 1.0 which represents the "ideal" case in which all species are equally abundant.

(Source: Marugurran, 1988)

Results and Discussions

The results have been summarized in Table I. The data reveal that the faunal species diversity and richness as well as evenness of the distribution of species is moderate in BNP and MNP, while these are good in INP and SNP. The value of Shanuan-Wiener biodiversity index for fauna is maximum (1.990) in SNP while it is minimum (1.631) in BNP. This shows that better species diversity and species richness in SNP in comparison to the other three PAs. Table-2 represents the computed biodiversity indices for some main faunal specie. The data reveals that Shanon diversity index for *Panthera tigris* is maximum (0.036) for BNP and for *Panthera pardus*, its value is maximum (0.037) for SNP. The species *Bubalus bubalisi* (wild buffalo) is well represented only in INP (with biodiversity index value 0.122).

Table 1

The faunal diversity indices in BNP, MNP, INP and SNP

PAs	H'	E'	Species diversity and richness	Species' Evenness
BNP	1.631	0.520	moderate	moderate
INP	1.963	0.626	good	good
MNP	1.651	0.534	moderate	moderate
SNP	1.990	0.634	good	good

Diversity: Low = $H' < 1.5$; Moderate = $1.5 < H' < 1.75$;

Good = $1.75 < H' < 2.0$; Very Good = $2.0 < H' < 2.5$.

Evenness: Low = $E' < 0.5$; Moderate = $0.5 < E' < 0.6$;

Good = $0.6 < E' < 0.75$; Very Good = $0.75 < E' < 1.0$.

Table 2

Biodiversity indices of main faunal species in BNP, INP, MNP and SNP, Madhya Pradesh

Species		Shannon-Weiner Biodiversity indices			
Local Name	Scientific Name	BNP	INP	MNP	SNP
Tiger	<i>Panthera tigris</i>	0.0364	0.021	0.001	0.021
Panther	<i>Panthera pardus</i>	0.0096	0.011	0.005	0.037
Chital	<i>Carvus axis</i>	0.359	0.367	0.365	0.092
Sambar	<i>Carvus unicolor</i>	0.226	0.191	0.159	0.338
Neelgai	<i>Boselaphus frangocamelus</i>	0.182	0.284	0.331	0.062
Chinkara	<i>Gazella bannti</i>	0.085		0.215	0.023
Blackbuck	<i>Antilope carvicarpa</i>	0.015		0.002	
Barking deer	<i>Munticus muntjak</i>	0.127	0.180	0.174	0.250
Sloth Bear	<i>Melursus ursinus</i>	0.027	0.065	0.018	0.074
Bison/Gaur	<i>Bos gaurus</i>	0.003	0.081		0.259
Wild buffalo	<i>Bubalus bubalis</i>		0.122		
Wild boar	<i>Sus scrofa</i>		0.325	0.265	0.363
Wild dog	<i>Cuon alpinus</i>	0.347	0.087	0.013	0.062

(Source: Kushwah, 1996)

The above faunal diversity has supplemented by studying the RDB status and abundance of the faunal species in the PA with the help of secondary and primary information. Box-2 illustrates the revised RDB categories of IUCN. Secondary information was taken from the data bank of Wildlife Institute of India (WII), Dehradun which was further confirmed by the observations in the field (i.e., the primary data). Table-3 illustrates the RDB status and abundance of faunal species in each of the four PAs. The abundance of the species has been categorized into scarce, occasional, frequent, and abundant (abbreviated as 1, 2, 3, and 4 respectively). The Table 3 data reveal that :-

Box-2**The Revised IUCN Red List categories**

1. *Extinct* : There is no reasonable doubt that the last individual of the taxon has died.
2. *Extinct in Wild* : The taxon is known only to survive in cultivation, in captivity or as naturalized population (or populations) well A the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual) throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
3. *Critically Endangered* : The taxon is facing extremely high risk of extinction in the wild in the immediate future.
4. *Endangered* : The taxon is not Critically Endangered but is facing a very high risk of extinction in the wild in the immediate future.
5. *Vulnerable* : The taxon is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.
6. *Conservation Dependent* : The taxon is not Critically Endangered, Endangered or Vulnerable but is the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
7. *Near Threatened* : The taxon is not Critically Endangered, Endangered or Vulnerable and does not qualify for Conservation Dependent but is close to qualifying for Vulnerable.
8. *Least Concern* : The taxon is not Critically Endangered, Endangered or Vulnerable and does not qualify for Conservation Dependent or Near Threatened.

9. *Data Deficient*: There is inadequate information to make a direct, or indirect, assessment of the risk of extinction based on the distribution and/or population status of the taxon. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Listing in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

10. *Not Evaluated*: The taxon has not been assessed against the criteria.

(Source : IUCN 1994 as quoted in Miller et al 1995)

Table 3

RDB status and abn as in BNP, INP, I SNP

Species (scientific name)	Species (common name)	BNP	INP	MNP	SNP
<i>Antelope carvicarpa</i>	Black buck	C; 3	P	C; 3	C; 3
<i>Bandicota bengalensis</i>	Lesser Bandicoot Rat	P	P	?	P
<i>Bandicota indica</i>	Bandicoot Rat	P	?	?	P
<i>Bos gaurus</i>	Gaur	P	C; 4; V	?	C; 2; V
<i>Boselaphus tragocamelus</i>	Nilgai	C; 2	C; 2	C; 3	C; 2
<i>Bubalus bubalis</i>	Wild buffalo	?	C; 1; E	?	?
<i>Canis aureus</i>	Jackal	C; 2; E	C; 3; E	C; 2; E	C; 2; E
<i>Canis lupus</i>	Wolf	C; 2; V	C; 2; V	C; 2; V	C; 2; V
<i>Carvus axis</i>	Chital	C*; 2	C*; 2	C*; 2	C; 2
<i>Carvus unicolor</i>	Sambar	C; 1	C; 1	C; 2	C; 3
<i>Cuon alpinus</i>	Indian wild dog	C; 2; V	C; 2; V	C; 1; V	C*; 2; V
<i>Cynopterus sphinx</i>	Short nosed Fruit Bat	P	P	P	P
<i>Elephas maximus</i>	Indian elephant	?	P; E	?	?
<i>Felis caracal</i>	Caracal	?	?	C; 1	?
<i>Felis chaus</i>	Jungle cat	C; 2	C; 2	C; 2	C; 2
<i>Funambulus palmarum</i>	3-stripped Palm Squirrel	P	P	?	P
<i>Funambulus pennanti</i>	5-stripped Palm Squirrel	?	C; 2	C; 1	?

<i>Gazella benneti</i>	Chinkara	P	?	C; 1	C; 1
<i>Hemiechinus benneti</i>	Long-eared Hedgehog	?	?	P	?
<i>Herpestes auropuntatus</i>	Small Indian Mongoose	P	P	P	P
<i>Herpestes edwardsi</i>	Common Mongoose	C; 2	C; 3	C; 3	C; 1
<i>Hipposideros speornis</i>	Schneider's L-nose Bat	?	P	?	?
<i>Hyaena hyaena</i>	Stripped Hyaena	P	P	P	C*; 2
<i>Hystrix indica</i>	Indian porcupine	C; 2	C; 3	C; 3	C; 3
<i>Kerivoula picta</i>	Painted Bat	P	?	?	P
<i>Lepus nigricollis</i>	Blacknapped Hare	C; 2	C; 2	C; 2	C; 2
<i>Lutra perspicillata</i>	Smooth Indian Otter	C; 2; K	C; 1; K	C; 1; K	C; 2; K
<i>Macaca radiata</i>	Bonnet Macaque	P	P	?	P
<i>Manis crassicaudata</i>	Indian Pangolin	C; 2; V	C; 1; V	C; 1; V	C; 2; V
<i>Mellivora capensis</i>	Ratel/Honey-Badger	C; 2	C; 2	C; 1	C; 1
<i>Melursus ursinus</i>	Sloth Bear	C; 2; 1	C; 2; 1	C; 3; 1	C; 2; 1
<i>Muntiacus muntjak</i>	Barking Deer	C; 2	C; 2	?	C; 1
<i>Mus booduga</i>	Indian Field Mouse	P	P	P	P
<i>Mus dunni</i>		?	P	?	?
<i>Mus phillipsi</i>		P	P	?	P
<i>Mus platythrix</i>	Spiny field Mouse	P	P	?	P
<i>Myotis peshwa</i>		P	P	?	P
<i>Nycticeilus pallidus</i>		P	?	?	P
<i>Panthera pardus</i>	Leopard	C; 4; T	Cf 3; T	C; 3; T	C; 2; T
<i>Panthera tigris</i>	Tiger	C; 2*; E	C; 3*; E	C; 2; E	C; 1; E
<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	C; 2	C; 2	?	C; 1
<i>Paraechinus micropus</i>	Pale Hedgehog	P	P	?	P
<i>Pipistrellus minus</i>	Indian Pygmy Pip.	P	P	P	P
<i>Presbytis entellus</i>	Common Langur	C*; 2	C; 2	C*; 2	C*; 3
<i>Pteropus giganteus</i>	Indian Flying Fox	P	P	P	P
<i>Rattus blandfordi</i>	White-tailed Wood Rat	P	P	?	P
<i>Rattus norvegicus</i>	Brown Rat	C*; 3	P	P	P
<i>Rattus rattus</i>	Black Rat	C; 2	C; 3	?	C; 3
<i>Rhinochrysa microphyllum</i>	Greater Mouse-tailed Bat	?	P	P	?
<i>Scotomenes emarginatus</i>		?	P	?	P
<i>Scotophilus heathi</i>	Common Yellow Bat	P	P	?	P
<i>Scotophilus kuhli</i>	Lesser Yel. House Bat	?	?	?	P
<i>Suncus dayi</i>	Shrew	P	P	?	P
<i>Suncus eustrucius</i>	Pygmy W-toothed Shrew	P	P	?	P
<i>Suncus muninus</i>	House Grey musk Shrew	?	?	P	P
<i>Suncus stoliczkenus</i>		?	?	P	P

<i>Sus scrofa</i>	Wild Boar	C; 1	C; 3	C; 3	C; 2
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	P	P	P	P
<i>Taphozous longimanus</i>	Long-winged Tomb Bat	P	P	?	P
<i>Taphozous melanopogon</i>	Bearded Sheath tailed Bat	P	P	?	P
<i>Taphozous saccolaimus</i>		C; 2	P	?	P
<i>Tetracerus quadricornis</i>	Four-Horned Antelope	C; 2	C; 3	C; 3	C; 2
<i>Tragutus meminna</i>	Spotted Chevrotain	C; 2	C; 2	C; 3	?
<i>Tylonycteris pachypus</i>	Flat-headed Bat	P	P	P	?
<i>Viverra zibetha</i>	Large Indian Civet	P	P	?	P
<i>Viverricula indica</i>	Small Indian Civet	P	P	?	P
<i>Vulpes bengalensis</i>	Indian Fox	C; 2; K	C; 3; K	C; 2; K	C; 2; K
Total Confirmed Species		27	27	25	27
Total Probable Species		28	31	13	29

Species Key :—*P* = Possible/Probable*C* = Confirmed**RDB status code :***T* = Threatened;*V* = Vulnerable,*E* = Endangered**Abundance code :—***1* = scarce; *2* = occasional*3* = frequent; *4* = abundant**PA code :***INP* = Indravati NP*MNP* = Madhav NP;*SNP* = Satpuda NP*BNP* = Bandhavgarh NP**Note :—***indicates species' status different from that of WII (1995)

(Source : Kushwah, 1996)

1. The major probable species, in the BNP, are gaur, chital, chinkara, small Indian mongoose, striped hyena, bonnet macaque, bandicoot rat, brown rat, pale hedgehog, Indian flying fox, Egyptian free-tailed bat, long-winged Tomb bat, beard sheath-tailed bat, common yellow bat, flat-headed bat, and Indian civets. The major confirmed species in BNP are Tiger (*Panthera tigris*), Panther (*Panthera pardus*), Blackbuck (*Antelope carvicarpa*), Neelgai (*Boselaphus frangocamelus*). Jackal (*Canis auratus*), Wolf (*Canis lupus*), Chital (*Carvus axis*), Sambar (*Carvus unicolor*), Barking deer (*Muntiacus muntjak*), Wild boar (*Sus scrofa*), Wild dog (*Cuon alpinus*), Jungle cat (*Felis chaus*), Common mongoose

(*Herpesles edwardsi*), Blacknapped hare (*Lapus nigricollis*), Indian porcupine (*Hysbix indica*), smooth Indian otter (*Lutra perspicillata*), Indian pangolin (*Manis crassicaudata*), Ratel or Honey-Badger (*Meltivore capensis*), Sloth Bear (*Melursus ursinus*), Common langur (*Presbytis entellus*), Brown rat (*Rattus norvegicus*), Common Palm civet (*Paradoxuru harmaphroditus*), Black rat (*Rattus rathus*), Spotted chavrotain (*Tragulus meminna*), and Indian fox (*Vulpes bengalensis*).

2. The major confirmed species in the INP are Tiger (*Panthera tigris*), Panther (*Panthera pardus*), Gaur (*Bos gaurus*), Wild buffalow (*Bubalus bubalis*), Neelgai (*Boselaphus frangocamelus*), Jackal (*Canis aurius*), Wolf (*Canis lupsus*), Sambar (*Carvus unicolor*), Barking deer (*Muntiacus muntjak*), Wild boar (*Sus scrofa*), Fourhorned antelope (*Tetracerus quadricornis*), Wild dog (*Cuon alpinus*), Jungle cat (*Felis chaus*), Common mongoose (*Herpesles edwardsi*), Indian porcupine (*Hysbix indica*), Smooth Indian otter (*Lutra perspicillata*), Indian pangolin (*Manis crassicaudata*), Ratel or Honey-Badger (*Meltivore capensis*), Sloth Bear (*Melursus ursinus*), Common langur (*Presbytis entellus*), Brown rat (*Rattus norvegicus*), Common Palm civet (*Paradoxuru harmaphroditus*), Black rat (*Rattus rattus*), Spotted chavrotain (*Tragulus meminna*), and Indian fox (*Vulpes bengalensis*).

3. The major confirmed species in the MNP are Tiger (*Panthera tigris*), Panther (*Panthera pardus*), Black buck (*Antilope carvicarpa*), Neelgai (*Boselaphus frangocamelus*), Jackal (*Canis aurius*), Wolf (*Canis lupsus*), Chital (*Carvus axis*), Sambar (*Carvus unicolor*), Four-horned antelope (*Tetracerus quadricormis*), Wild dog (*Cuon alpinus*), Caracal (*Felis caracal*), Jungle cat (*Felis chaus*), Chinkara (*Gazela benneti*), Common mongoose (*Herpesles edwardsi*), Indian porcupine (*Hysbix indica*), smooth Indian otter (*Lutra perspicillata*), Indian pangolin (*Manis crassicaudata*), Ratel or Honey-Badger (*Meltivore capensis*), Sloth Bear (*Melursus ursinus*), Common langur (*Presbytis entellus*), Black rat (*Rattus rattus*), Spotted Chavrotain (*Tragulus meminna*), and Indian fox (*Vulpes bengalensis*).

4. The major confirmed species in the SNP are Tiger (*Panthera tigris*), Panther (*Panthera pardus*), Gaur (*Bos gaurus*), Black buck (*Antelope carvicarpa*), Neelgai (*Boselaphus frangocamelus*), Jackal (*Canis auris*), Wolf (*Canis lupus*), Chital (*Carvus axis*), Sambar (*Carvus unicolor*), Barking deer (*Muntiacus muntjak*), Chinkara (*Gazela benneti*), Four-horned antelope (*Tetracerus quadricornis*), Wild boar (*Sus scrofa*), Wild dog (*Cuon alpinus*), Jungle cat (*Felis chaus*), Common mongoose (*Herpesles edwardsi*), Blacknapped hare (*Lapus nigricollis*), Indian porcupine (*Hysbix indica*), smooth Indian otter (*Lutra perspicillata*), Indian pangolin (*Manis crassicaudata*), Ratel or Honey-Badger (*Meltivore capensis*), Sloth Bear (*Melursus ursinus*), Common langur (*Presbytis entellus*), Common Palm civet (*Paradoxuru harmaphroditus*), Black rat (*Rattus rattus*), spotted chavrotain (*Tragulus meminna*), and Indian fox (*Vulpes bengalensis*).

Conclusion

Attempt has been made for the first time to work out the biodiversity indices for fauna in the four PAs, i.e., the Bandhavgarh (BNP), Indravati (INP), Madhav (MNP) and Satpuda (SNP) national parks of Madhya Pradesh following standard sampling techniques and formulae. The values on Shannon-Wiener biodiversity indices as computed are found to be highest in SNP followed by INP. The values of the index of evenness is also highest for SNP followed by INP. Therefore, the areas of these PAs with lower diversity indices need to be given more attention for protection and conservation of biodiversity. In fact, these areas being peripheral to territorial divisions are more affected by the biotic pressures from the adjoining villages which need to be minimized. Thus, the study is not only of academic interest but relevant for management of the protected areas (PAs).

Acknowledgement

The paper is based on the findings of the research project titled : "Integrated Forest Planning and Management of the Protected Areas of Madhya Pradesh—with special reference to Central Madhya Pradesh",

Department of RPEG, Berktullah University, Bhopal. The authors duly acknowledge the HOD and faculty members of RPEG Department, Berktullah University and Dr. P.C. Kotwal, Faculty, IIFM, Bhopal and the field managers of the PAs under study for their co-operation for this work.

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TETRAPODES OF RAJGIR WILDLIFE SANCTUARY, BIHAR

By

Yadunath Prasad Sinha

Forest of Rajgir was declared as 'Wildlife Sanctuary' on 25th May 1978 under Wildlife (Protection) Act 1972. It is in the valley of Rajgir Hills over about 35.45 sq. km. area surrounded by Vaibhara, Vipula, Ratna, Udaya and Sona Hills. It is situated in the Nalanda district of Bihar, about 106 km. from Patna, the capital of Bihar. It lies between 25°0' to 25°3' N. Lat. and 85°20' to 85°27' E. Long. Inside the sanctuary there are 38 km. roads for plying jeep and other vehicles. The central part of the core area, within the sanctuary, is approximately 12 sq. km. and the rest is under buffer zone. Besides hot springs, fifteen main water holes, such as Khairi, Baghmarua, Kamania, Chotaki Tumaria, Jora Kasha, Hubua-Tin-Talab, Jamari, Chataleba, Amjhar, Bansari Pokhar, Ujarki Pokhar, Basahi Pokhar, Bhelbadome, Jaladevi and Banganga are the main source of water for survival of animals in and around the sanctuary. These water holes are mostly rain fed, the average rainfall of the area being 1051.4 mm. per year as per record.

The climate is very hot in summer (max. temp. about 39°C and min. about 19°C) and very cold in winter (max. temp. about 27°C and min. about 10°C). October and November are quite pleasant as the weather is very bracing.

At present the condition of the forest and its wildlife in the sanctuary is not as good as it used to be thirty years ago due to regular cutting of woods, grazing pressure, habitat destruction, vehicular movement, intentional and unintentional killing of wild animals etc. But in spite of all this the area possesses a very wide range of biological diversity, both in respect of flora and fauna. The rich and varied flora is used by the tribal inhabitants of this area for medicinal purposes and also as a life sustaining resource.

An observation was made with the help of forest officials during my recent visits : (1) in the second week of December, 1986; (2) in the last week of April, 1987; (3) in the third week of December, 1987; and (4) in the third week of September, 1996, the upper most portions of the hills and the slopes were found covered with small trees like Salai or Gugul (*Boswellia serrata*), Amaltas (*Cossia fistula*), Jangali Badam (*Sterculia* sp.), Karaunda (*Carissa* sp.), Marchula (*Murraya paniculata*), *Acacia* sp. and *Zizyphus* sp. with shrubs like Bamboo (*Dendrocalamus* sp.), Night jasmine or Harshingar (*Nyctanthes arbortristis*), Indigo or Neel (*Indigofera elliptica*), Kutas or Karchi (*Holarrhena antidysenterica*) etc. and herbs like Salpan (*Desmodium gangeticum*), *Hibiscus* sp., Cocks comb or Jatadhari (*Celosia* sp.) etc.

The valley has thorny and scrubby type of vegetation with the prominancy of *Dendrocalamus strictus*. Among the trees Dhak (*Butea frondosa*) and Gambar (*Gmelina arborea*) are conspicuous. Undergrowth consists of shrubs like Hiun (*Capparis* sp.), Indian Plum or Ber (*Zizyphus mauritiana*), Vasaka (*Adhatoda vasica*), Ak or Madar (*Calotropis gigantea*) etc. These shrubs grow in clumps separated from each other by coarse grasses (*Helicteres* sp. and *Sida* sp.) and the criss-cross pathways.

Sporadic trees like Banyan (*Ficus bengalensis*), Pakar (*Ficus infectoria*), Peepal (*Ficus religiosa*), Mango (*Mangifera indica*), *Eucalyptus* sp., Wood Apple (*Aegle marmelos*), Kait (*Feronia limonia*), Shirish (*Albizza* sp.), Amla (*Phyllanthus emblica*), Shisham (*Dalbergia sissoo*) etc. have been seen in the villages and road sides in and around sanctuary.

Besides the above trees, some shrubs like Vasaka (*Adhatoda vasica*), Karaunda or Gooseberry (*Carisa* sp.), Ak or Madar (*Calotropis gigantea*), Babul (*Acacia* sp.), Wild Custard Apple (*Annona* sp.), Wild Ber (*Zizyphus* sp.), Jangali Anar (*Punica* sp.), Kaner (*Nerium indicum*), *Lantana* sp.; herbs like Dub (*Cynodon* sp.), Motha (*Cyperus* sp.), Spider Wort or Gumma (*Leucas* sp.), Ban Kauni or Fox-tail Grass (*Setaria* sp.), Bhukul or Black Night Shade (*Solanum* sp.), Wild Tobacco (*Nicotiana* sp.),

Bhant (*Clerodendron* sp.) and Datura or Jimson weeds (*Datura* sp.); and parasitic weeds like Amarbel (*Cuscuta reflexa*) and Banjhi or Strap flower (*Dendrothe falcata*) etc. have been localized in the vicinity of the sanctuary. Afforestation work has also been done in Rajgir and about one lakh seedlings of different trees were planted in 1986.

Following information on the Tetrapodes of the sanctuary has been provided here on the basis of previous record (Kumar, 1970); authentic information obtained from Rajgir Forest office and local peoples; and by personal field observations.

Once some big mammals like (1) Hyaena (*Hyaena h. hyaena* (Linnaeus)), (2) Wild Boar (*Sus scrofa cristatus* Wagner), (3) Nilgai (*Boselaphus tragocamelus* Pallas), (4) Black Panther or Leopard (*Panther pardus fusca* (Mayer)), (5) Black Bear (*Melursus U. Ursinus* (Shaw) and (6) Black Buck or Indian Antelope (*Antelope cervicapra rupicapra* Miiller) were once abundant in the Rajgir Forest, are rarely seen now-a-days in the sanctuary. Sinha (1996) saw a Black Panther in the evening at dusk crossing the road that divides the forest between Swarna Bhandar and Maniar Math. Black Panther that was found in Rajgir Sanctuary is not a separate species but a freak and comes under vulnerable (vu) categories in India. Black Buck also comes under vulnerable (VU) categories in India and is rarely seen by local people in Rajgir. Nilgai, a common antelope is found in open forest and in agricultural field around sanctuary. (7) Wolf (*Canis lupus pallipes* Sykes) once common in the Rajgir forest, is now practically missing. (8) Jackal (*Canis aureus indicus* Hodgson) has been seen by local people at various occasions. (9) Fox (*Vulpes bengalensis* (Shaw) was seen by us on 26th April 1987 on the carcass of a domestic animal near the base on Sona Hill. (10) Wild cat (*Felis chaus kuta* Pearson) and (11) Mongoose (*Herpestes edwardsi nyula* Hodgson) is often seen in the sanctuary. (12) The Indian Pangoline (*Manis crassicaudata* Gray), a vulnerable (VU) species in India, is often seen in this area. They are ant and termite eaters, and possess, the long snout, sticky tongue and heavy claws for digging into ant and termite mounds. Recently this mammal was

seen and killed by local people near Rajgir in Nalanda district (Mayank 1995). They thought it a ferocious animal due to lack of knowledge. (13) Rhesus Macaque (*Macaca m. mulata* (Zimmermann) and (14) Hanuman Langur (*Presbytis e. entellus* (Dufresne) are local migrants in Rajgir. A troupe of about 20 Hanuman Langurs was seen by us on 7 December, 1986 near Santi Stoop and again in the evening of 24 April, 1987 in jumping, running and sitting postures on Vipula Hills but it was not seen on 25 and 26 April, 1987 anywhere in Rajgir.

Among small mammals, (15) Hare (*Lepus nigricollis ruficaudatus* Geoffroy) is always seen in the evening and in the night. On the night of 26 April, 1987 we saw many hares while crossing the forest. (16) Five striped Squirrel (*Funambulus pennanti* Wroughton), (17) House Rat (*Rattus rattus rufescens* (Gray)), (18) House Mouse (*Mus musculus* Waterhouse) and (19) Bandicoot Rat (*Bandicota b. bengalensis* Gray) are very common in Rajgir as in other places of Bihar. (20) Porcupine (*Hystrix i. indica* Kerr) is occasionally seen in the forest.

In the evening, flying mammals like (21) Flying Fox (*Pteropus g. giganteus* Briinnich) is always seen in the sky passing through the sanctuary and (22) the small Pipistrelle (*Pipistrellus mimus* Wroughton) flying among houses.

Birds are glimpse of the sanctuary. Besides (1) House Crow (*Corvus splendens* Vieillot), (2) Jungle Crow (*Corvus macrorhynchos* Wagler), (3) House Sparrow (*Passer domesticus* Linnaeus), (4) Indian Myna (*Acridotheres tristis* Linnaeus), (5) Pied Myna (*Sturnus contra* Linnaeus) and (6) Blue Rock Pigeon (*Columba livia* Gmelin) are very common, like in other places in Bihar. Birds observed in and around the sanctuary are (7) Spotted Owlet (*Athene brama* Temminck), (8) Brown Dove (*Streptopelia senegalensis* Linnaeus), (9) Forked common Pariah Kite (*Milvus migrans* Boddaert), (10) Cattle Egret (*Bubulcus ibis* Linnaeus), (11) Little Egret (*Egretta garzetta* Linnaeus), (12) The Paddy Bird or Pond Heron (*Ardeola grayii* Sykes), (13) Little Cormorant

(*Phalacrocorax niger* Vieillot), (14) The Jungle Babbler (*Turtoides striatus* Dumont), (15) The Black Drongo (*Dicrurus adsimilis* Bechstein), (16) Male Koel (*Eudynamys scolopacea* Linnaeus), (17) Crow Pheasant (*Centropus sinensis* Stepheus), (18) The common Green Bee-eater (*Merops orientalis* Latham), (19) Indian Roller (*Coracias benghalensis* Linnaeus), (20) Hoopoe (*Upupa epops* Linnaeus), (21) The common Green Pigeon (*Treron phoenicoptera* Latham), (22) Tickell's Fly Catcher (*Muscicapa tickelliae* Blyth), (23) Purple Sun Bird (*Nectarinia asiatica* Latham), (24) Weaver Bird (*Ploceus benghalensis* Linnaeus), (25) Rosefinch (*Carpodacus erythrinus* Pallas) and (26) Pied Bushchat (*Saxicola caprata* Linnaeus).

Some birds such as (27) Common Pea-fowl (*Pavo cristatus* Linnaeus), (28) Red Jungle Fowl (*Gallus gallus* Linnaeus), (29) Grey Partridge (*Francolinus pondicerianus* Gmelin), (30) Jungle Bush Quail (*Perdicula asiatica* Latham) are not seen by us but they are recorded as game birds of Rajgir forest.

Various types of migratory birds like (31) Stork (*Anastomus oscitan* Boddaert), (32) Janghil or Painted Stork (*Ibis leucocephalus* Pennant), (33) Black Ibis (*Pseudibis papillosa* Temminck), (34) Brahminy Duck (*Tadorna ferruginea* (Pallas), (35) Comb Duck or Nakta (*Sarkidiornis melanotas* Pennant), (36) Common Teal (*Anas crecca* Linnaeus), and (37) Common Snipe (*Capella gallinago* Linnaeus) were observed in Chaur near wet land.

Reptiles are generally ferocious animal. We get scared when we suddenly see them. In spite of that some people kill them for meat and skin. They were not found plenty in number. Only five species have been observed in the sanctuary and around, such as (1) Garden Lizards (*Calotis versicolor* Daudin), a common species, were seen in large number running up and down on trees, bushes and on the ground. (2) Common Wall Lizard (*Hemidactylus flaviridis* Ruppel) was found running below ceiling of rest house towards tube light for catching insects which were available in large number on the wall. Common lizards were sufficient in number in the houses of Rajgir. (3) (*Mabuya*

carinata Schneider) and (4) *M. dissimilis* Hallowell was seen among accumulation of rocks and underwood logs. A small (5) Clouded Monitor (*Varanus flavescens* Gray) was seen moving upon stones on road side near the base of Vipula Hills and entered quickly in a burrow underneath a cluster of thorny bushes. No snake was encountered by us in and around the sanctuary. Previous records and information given by local people reveal the presence of (6) Cobra (*Naja naja* Linnaeus), (7) Karait (*Bungarus caeruleus* Schneider), (8) Dhamin (*Ptyas mucosus* Linnaeus), (9) Donr (*Enhydris* sp.) and (10) Hurhura (*Natrix* sp.) in this area.

Among Amphibians (1) The Indian Bull Frog (*Rana t. tigrina* Daudin) is common in tanks and ponds. (2) The Skipping Frog (*Rana cynophlyctis* Schneider) which is entirely aquatic and can skip over small distances and float on water was seen in large number in ditches full of water. (3) The Paddy Field Frog (*Rana limnocharis* Schneider), a smaller type of frog was seen leaping into water of paddy fields (4) The Common Indian Toad (*Bufo melanostictus* Schneider), a large and stout toad, was seen under logs, stones and dark corner of houses during day time. In the night it was found under electric lights waiting for stunned insects to drop down the ground.

Acknowledgement

The author is grateful to Dr. J.R.B. Alfred, Director, Zoological Survey of India for help and facilities during preparation of this paper.

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SENTRIES OF THE WILD

By

Kumar Taranand Sinha

The sideways journey of the mighty Kosi had started from East to West. Flowing North to South through the alluvial soil of East Bihar in Purnea district to meet the Ganga, in late twenties, it had moved through Purnea, Madhepura, Saharsa and was touching the eastern fringe of Darbhanga district by late thirties covering a sideways drive of about seventy kilometres from East to West. In this process the turbulent river had devastated the countryside, throwing up enormous quantity of sand and silt and washing away entire villages, destroying houses, temples, churches, palaces and whatever came its way. The river with its numerous fast flowing channels created swamps on both sides, which harboured dozens of short and long nosed crocodiles, varieties of fish and was the home of migrating waterbirds like mallards, pochards, pintails, teals, moorhen and geese.

It was in early forties that we decided to have a X-mas outing in the wild and camped on the eastern bank of one of the channels of Kosi. Next morning I took a dinghy boat and floated down the fast flowing river. By 9.00 A.M. crocodiles had come out basking in the sun and to my surprise I saw six to seven of them in different sizes on numerous sandbanks but invariably they jumped into water on seeing our boat and floated with nose and parts of the body over water. It was bitter winter and again on my return trip I found them basking in the sun.

The villagers knew about our camp and two days later, in the evening when we were sitting around the camp-fire, two of them came to report that a huge crocodile had been grabbing and taking away men and women while they were wading through the river where it was wide and shallow. The crocodiles had eaten more than a dozen

women. They wanted us to shoot and kill the dreaded beast. The river-ghat around which this brute used to live in the hope of women crossing was about three kilometres from our camp. Next day we went to see the place and found the huge crocodile (MUGAR) basking in the sun but it slid into river on seeing the boat. It came out again after a few minutes. There were a few dry Shisham trees on that bank and one or two Cormorants were sitting on the tree. The other bank had thick grass jungle. We got down from the boat and through the grass jungle we crawled to the bank so that the crocodile could not see us. But as soon as we were near the bank the cormorant flew with alarm call and the crocodile jumped into the river. Everytime we tried, the same thing happened; when the crocodile came out the cormorant also perched on the tree and flew as soon as it saw our movement in the jungle. Disappointed we returned to our camp.

We discussed the matter round the camp-fire and made out our plan. We gathered from the folk that the beast keeps sitting on the bank when the villagers pass and the cormorant also does not give the alarm call. We dressed like villagers in dirty KURTA AND DHOTI and tried to approach the place from where we could shoot the fellow. The bird gave the call and the crocodile vanished. We crouched to the place from where a good shot across the river was possible and lay there silently and quietly with rifles loaded. Lo and behold, in a few minutes the cormorant came and perched on the dead tree and the crocodile came out to bask in the sun. We got the opportunity. My brother aimed at the heart area and I aimed at his hip to paralise his four legs so that he does not crawl into the river after being shot. We fired. The bullets found their place. The huge brute did not move, and was dead. We tied him behind the boat and floated him to our camp. It measured 21 feet from head to tail. It is still with us, stuffed and kept in our old palace Durbar Hall. Next morning when he was skinned, to our surprise, we collected from his stomach about four kilograms of silver ornaments which he had devoured from the bodies of his victims. No sooner the people in the area got the news, which spread like wild fire, they gathered at the place where the crocodile

was being skinned and in bits took away all the silver articles, saying they were for medicinal purposes.

We stayed in the camp for a week and every day we enjoyed boat ride in different channels of the Kosi and came across atleast hundred short and long nosed crocodiles and in every case we found cormorants perched on dead or dry treetops and their flight coincided with the crocodiles diving into the deep river. These cormorants, to my mind, were natural sentries of the crocodiles and gave the alarm signal functioning like a guard.

This prompted me to find out if other animals also have the same sentry phenomena. The next to be watched were Leopards. They were in very large numbers in devastated Kosi area where in the early forties the Hog Deer, Wild Pigs, Nilgai or Blue Bull, Floricans and black and swamp Partridges were found in hundreds. All these were easy food for the leopards, but sometimes a stray leopard would visit the village at dusk and kill a goat, calf or even a chicken. One such leopard had made it a habit to kill in the village and not his natural prey in the jungle. One day this leopard killed a village pony and naturally the villagers were very irritated and came to request me to kill the leopared and save the village animals. The pony killed was in the middle of the village and was lying unprotected near a mango tree. I sat on a CHOWKI just inside the courtyard fencing. Around sunset, I heard the low barking of something coming closer. It was still not dark. The fellow was a leopard cat locally known as 'Faksiyal'. It was followed, within minutes by the leopard. On smelling us the civet or leopard cat fled and the leopard also fled. But hunger brought the leopard back to its kill. It came sniffing upto about three feet from me on the other side of the fence and then returned to eat its kill. He was shot. Annually we used to go to Nepal Terrai in Morung District for our shikar camp and had the opportunity of seeing hundreds of leopards at dusk and dawn, always preceded by the same variety of civet. Probably the civet was the sentry of the leopards in the area. I have seen many leopards even in the day time going to the

river or some waterhole but never seen the civet. Probably the civets guard the leopards only on their morning and evening outings.

I have seen only one Snow Leopard in my life. That was in the vicinity of the Kedarnath temple in Garhwal just below the glacier. In 1945 we took a trip to Gangotri late in May. I wanted to trek from Gangotri to Kedarnath by a bridle path to see the fauna and flora of the area. We took the route from Bhatwari via Burha Kedar, Pawali and Maghuridge and came down near Trijugi Narain to catch the path to Kedarnath. Passing through dense forest and thick grass above the treeline, we saw all sorts of animals as well as flowers and ground lily and passed through snow over some stretches. It was fantastic and breathtaking. Reaching the shrine of Kedarnath we decided to spend three or four days there; we found the area so fascinating.

It was a moonlit night. The next evening the local priest (Pandaji) came with a shephard to tell us that a leopard has killed and taken away a lamb from the herd of sheep and was eating it about 200 yards from the temple. The shephard wanted us to kill the leopard. We were in no mood to kill anything near the shrine and more so a leopard which we felt must be a snow leopard. However, I was very eager to see it. It was a God sent opportunity. We took a flashlight and proceeded silently towards the place guided by the shephard. At an altitude of about 11,000 feet the moon is very bright on clear nights. As I approached the place I saw a bird almost like a nightjar give a shriek and fly and simultaneously an animal fled away from the dead lamb. We hid behind a boulder and within minutes the bird flew in and settled near the lamb. The leopard followed within seconds. I could see him clearly in the moonlight. He was greyish white in colour, not more than four feet long with a tail almost as long as the body. He was holding the lamb in his mouth. We watched for two minutes; then to have a clearer view switched on the flashlight. The same instant the bird flew with a shriek and the snow leopard was gone but carried away the lamb also in his mouth. I was well rewarded. The bird was, in my opinion, the sentry' of the Snow Leopard. It could not

be a nightjar as they do not go such high in the hills, but it was very akin to the nightjar.

It was in Baltistan, again in the early forties, that I went to see Ibex and Ghurals. The mountains are steep and the terrain difficult. While I located only three Ghurals (Wild Goat) during my three day trip, Ibex were in plenty. It is terribly cold in the morning but that is the time when they come out grazing in the meadows in small herds. Me and my friend Late Raja Saheb of Barwari located one such herd with our binoculars. With our guide we took a detour through whatever scanty cover we had, but as soon as we climbed a ridge to have a clear view, a lone Ibex gave a call and all the grazing herd galloped off immediately to take cover. The same happened the next morning again. When the herd is grazing in the open, the long young Ibex keeps a guard/vigil on any intruder coming. Disappointed we were returning when we came across a massive male Ibex and shot him with a camera. We felt happy.

This same sort of guiding we came across several times in the Morung forest of Nepal Tarrai in the Kosi belt. Literally we saw huge herds of Spotted Deer resting or grazing in the open area of Sal forest with lone young Cheetal about a hundred yards away from the herd. Invariably the Cheetal barked on seeing us and the herd galloped into the adjoining Sal forest. But when we came across a lone or a small herd of three or four Cheetal stags grazing, they never fled but looked at us and then started feeding.

These two stag varieties are the only ones where I found the same species doing the sentry duty also. Take for example the Sloth Bear found in plenty all over the hills in Bihar. I had been invited by the District Administration and Forest Department to shoot a man-eating Leopard in the jungles of Banka. Because of Mahua fruits and wild plum (Ber) these hills provide easy food to the Sloth. They are lazy creatures and sleep most of the time during the day in the shade of Plum bushes or other shades in the jungle. But they were invariably guarded by lone Red Wattled Lapwing (Plover, Tetahi) sitting in the sun

a few feet away from the Sloth. Any movement around the place, and these birds will speed away or fly uttering a sharp cry to wake up the Sloth. This has been noticed by me, both in the Banka hills and Kharagpur hills of Munger district. But when in summer the Sloth sleep in the thick jungle, the bird is absent.

I have not seen many Tigers in Indian forests, except a few in day time inside the Dudwa National Park, some in the forest on both banks of River Belan in Robertsganj area of Uttar Pradesh, and recently in the Satpura National Park in Madhya Pradesh while trekking there on foot. But I must have come across plenty of Tigers in the Sal forest of Nepal Tarrai and watched them and their behaviour. Once when I was walking on a forest trail of animals around 3.00 p.m. to watch Cheetal and Sambhar stags and Pigs enjoying their afternoon siesta in the shade of Sal trees, I heard a queer purring sound of that of a large cat, which grew in frequency as I went ahead. Sensing some danger, I stood and then sat to see what was making the sound; lo and behold ! I saw a huge Tiger sitting and looking at me from hardly a distance of 15 feet. I watched him well and then took a few backward steps and went in the opposite direction. Obviously he was taking rest, with no sentry to warn him. Recently in the Satpura National Park, around mid-day, I was trekking to visit the shrine of Marra Dev and had left my vehicle on the hilltop. Hardly had I gone a kilometre when I saw fresh Tiger pugmarks on the trail I was walking. At one spot, sand particles were still falling in the deep pugmark indicating that beast was very near. I walked continuously looking on both sides and suddenly saw the huge head of the tiger, standing and looking at me. He did not move to charge and I walked my way on the trail. Here also there was no alarm signal and obviously there was no sentry. I was convinced that in the thick jungle, Tigers have no sentry as they do not apprehend any danger. Also that, tigers do not attack man unless he is a man-eater or unless the tiger is disturbed unnecessarily by human beings.

But in the tarrai jungles, especially in grassy area, I must have observed a jungle crow always flying over a prowling tiger in the day time. To us that indicates the route of the tiger moving early morning or a few minutes before sunset towards a flowing river or rivulet to quench his thirst. However, it may be that the crow is cowing to give a green signal to move ahead, because the tiger in thick and high jungle cannot see beyond a few yards while the flying crow can spot anything moving on the track. This phenomena I have observed in the tigers in the Dudwa National Park and in the Himalayan Tarrai of the Kosi river where tigers were in abundance, and also in the jungles on both the banks of Mechi river near Naxalbari in West Bengal. I am quite convinced that the jungle crow guides the tiger in day time, but I have not seen any sentry with a tiger after dark.

Another species of wild animal, the wild Buffalo were in hundreds in the grassy jungles of Purnea district adjoining the Kosi tarrai of Nepal about forty years back. They were very shy but idlers. They moved in herds eating the grass and in the midday, wallowed in muddy waters or swamps even in winter. They are almost extinct in Bihar due to patronage to poachers by politicians and their like, for meat, skin and the huge horns. I had observed that when they were grazing in the morning and evening, the Blue-Grey Bank Myna in dozens would sit on their back for two purposes. They pecked and ate the insects from the body of the buffaloes and also alerted the animals if they saw something unusual including human beings approach. At their call and flying, the herd of buffaloes would canter and gallop away and only stop long distances away to look back. When wallowing in mud their companion is no other than the Egrets either sitting on their body or on the bank of mudpool or on any adjacent tree. They would fly away with croaking sound to alert the animals of any impending danger. The buffaloes would get up slowly and then gallop away in the opposite direction.

Recently this phenomena has been observed in the Wild Buffalo Reserve on the eastern side of Kosi within the embankment where the Government of Nepal have preserved the wild buffaloes and converted the place into a tourist spot which can be visited from Biratnagar in eastern Nepal. It is a sight worth seeing. Apart from herds of buffaloes you can see herds of wild boars and hog deers loitering about in the day time.

I have penned down this phenomena of "Sentries of the wild", to attract the attention of people interested in Wildlife to arouse their interest in this area of the natural habitats of wild animals. May be my findings are contradicted in future if someone makes a detailed study of this behaviour.

CHEMISTRY OF FOREST FIRES

By

I.S. Negi, IFS (Retd.)

FIRE has again struck the forests of Garhwal and Kumaun this year and engulfed the precious forests over 5000 sq. kilometres. An equally devastating forest fire took place in 1995 in Kumaun, Garhwal and Himachal Pradesh forests and destroyed nearly 3000 sq. kilometre area. The damage caused to vegetation, wildlife and ecology was colossal and irreparable. The forest fire of 1995 summer was rather unprecedented both in extent and duration. The fire engulfed the entire forest area in the hills of Uttar Pradesh and Himachal Pradesh. The local people, tourists, journalists and passersby alleged that the forest departments of these states had turned apathetic and remained mute spectators while fire was devastating the precious forests. The forest staff who was responsible for tackling the fire found themselves utterly helpless and thoroughly incapable of fighting it out. They left it to the ensuing rains to ultimately put it out or let it die down finally when every thing had been burnt.

The large scale damage caused by 1995 fire to the forests and environment and also the mounting criticism of the forest department both by the public and the press and the wild allegations hurled by the villagers and forest officials against each other made the administration worrisome, so much so that the Government of India was obliged to constitute a two member committee, comprising of Chief Secretary of Uttar Pradesh and a retired Chief Conservator of Karnataka on 11-7-95, to look into the causes of such a large scale fire, amount of damage done by the same and remedial measures against recurrence of such widespread fires. The said committee submitted its report in December 1995 and recommended along with others some hi-tech measures to fight forest fires. The success of the measures suggested by the said committee against occurrence of forest fires and fighting them will depend upon how faithfully they are implemented by the

ground staff and the efficacy of the modern fire fighting techniques will depend on how much money the government provides for these operations. At the moment the suitability of the recommendations seems to be doubtful. The devastating fires of 1995 also fuelled a serious controversy and gave rise some misunderstanding among the general public. They believed that timber mafia in league with the local forest staff burn the forest to cover up illicit felling of trees and poor quality plantation work done by them. There may be (some) exceptions but by and large these notions are baseless and wrong. The recommendations of the aforesaid committee and implementations thereof failed to dispel the misgivings from the minds of general public and they are as wise as ever before.

Genesis : Forest fires are not new. Ever since man started interacting with nature, forest fires have been more or less a regular feature. In the remote past when forest cover was dense and there was more moisture in the soil and environment, forest fires were neither fierce nor so widespread. But now due to increased biotic activities and also due to global warming forest cover has drastically been reduced and in a prolonged dry season forest debris and leaf litter become bone dry and with wind blowing in hurricanes, fire starts at the drop of a hat. In the hills and especially in Chir pine forests leaf litter goes on accumulating with passing of every summer and after two or three years it becomes well nigh impossible to avoid a forest fire in these areas. Forest fires are fairly common. They are almost annual feature in chir pine forests. Chir pine like all other pines bear resin in its all parts. Chir pine leaves (needles) and cones (fruits) are resinous and when dry up and fall down, they become highly inflammable. They act as kindlers. Thicker the carpet of chir needles on the ground, more hazardous it becomes for forest fires. You can protect a chir forest from fire for one or two years but in the third or fourth year it becomes rather impossible to prevent the fire from occurring in chir forest. No other forests are so susceptible to fires as the chir pine forests.

Damage due to fires : Fire is enemy number one of forests, which does incalculable damage to forest environment and wildlife. A single

fire can completely ruin the forest and can wipe out efforts of generations of foresters. A fierce crown fire can destroy a whole mature forest in a single stroke and ground fire can wipe out entire regeneration, burn out humus and on steep slopes promote soil erosion. Far more than this forest fire lead to ecological imbalances. Fires not only burn alive the wildlife but also destroy the habitat, compelling the wild animals to migrate to inhospitable places only to get perished.

Causes of forest fires : Unfortunately there is a wrong notion among the general public that forests are burnt by timber mafia and forest official to cover up their wrong doings. This conception is not true. There are many factors that lead to forest fires. Forest fires are both accidental and deliberate. While accidental fires occur as a result of lightening and rolling rocks, a vast majority of them take place due to the carelessness of cow boys, pedestrians and bus passengers, who inadvertantly throw the butt ends of biri or cigarettes on the road side. Fires through lightening are rare and this author witnessed a forest fire caused in chir forest in June 1951 due to lightening. But the fire got immediately put out by a heavy shower of rain that followed the lightening, after burning a few acres of forest area. Forest fires supposedly caused by rolling rocks are very rare and are more a myth rather than truth.

The major source of forest fires is, therefore, accidental fires caused by pedestrians, bus travellers and graziers who carelessly throw cigarette butt ends which initiates the fire. More often than not, fire crosses over to the forest from adjoining cultivation, where the villagers burn leaf litter and agricultural refuse in their fields. Though the accidental fires caused due to carelessness of villagers and passersby cannot totally be eliminated, they can certainly be reduced with the help of local people by educating them and taking adequate preventive measures.

Forest fires started deliberately can be put into two categories. One started by villagers to burn forest litter and coarse dry grass in order to get a green flush of leaves with the beginning of monsoon.

Though fire does some good by burning dead material and promoting new flush of grass, but it often does irreparable damage to the vegetation, ecology and soil. The villagers also burn chir forest almost annually to rid of slippery pine needles which often cause difficulty for their cattle to forage in the forest. This evil practice of burning forest for a short term gain causes immense damage to the ground flora and forest ecology in the long run. In this process the tender and palatable grass is gradually replaced by coarse grass and weeds.

The second category of deliberate fires is that, started as a result of incendiarism and is by far the most dangerous ones. When local people are not satisfied with the forest policy of the government or are antagonised otherwise, they set the forest to fire in order to air their grievances. Large scale incendiarism took place in early 1920s, when local people burnt entire forest area of Kumaun and Garhwal as a protest against the anti-people forest policy of the government of that time, in course of reservation of forests and settlement of their rights. But incendiarism in the forests is now unknown after the Independence and establishment of popular governments. The menace of deliberate fires can be minimised by educating people and gaining their confidence and good will. Forests cannot be protected and preserved without active support of local people. Should they get antagonised, they will destroy the forest in no time and the ready tool of destruction in their hand is fire.

Fire Protection : Successful fire protection depends on a number of factors, such as topography, configuration of ground, amount of undergrowth present and degree of dryness of combustible material. Fire protection is a diverse problem and no single method of protection will work out for all localities. It is well said that prevention is better than cure. If adequate preventive measures are taken in the first place, very few forest fires will occur and fewer will turn into violent type of mass fires. Among the common preventive measures are cutting and burning of fire lines, keeping roads, paths etc., clean from leaf litter, making watch towers, employing fire watchers, providing a

quick and reliable system of communication, such as mobile wireless sets, walkie-talkie and last but not the least, control burning forest areas before the fire season, in order to reduce hazardous dry leaf litter.

In olden days, there used to be a fair network of fire lines in both plains and hill forests. These fire lines acted as barriers and prevented fire from crossing over from one area to another. Fire lines were generally made on ridges and spurs. They were 100', 50' or 25' in width, depending on the locations, that is 100' between two large forest areas, 50' between two forest blocks and 25' between compartments and sub-compartments. These fire lines were cut and burnt annually and kept clean of vegetation of all sorts. Rivers, streams and canals also served as natural barriers. In addition to that motor roads and bridle paths also served as fire lines. They were kept clean of leaf litter and regularly patrolled by fire watchers. But now partly due to paucity of funds and partly due to prevailing apathy and slackness in forest management, fire lines have been more or less abandoned. They have been invaded by trees, shrubs, creepers, etc. and have become non-existent.

Watch towers, mobile wireless sets and walkie-talkie are of immense utility. They help in detection of outbreak of fire and provide quick information so that fire fighting squads and equipment could be rushed to the site of occurrence and fire put out at the initial stage. Maintenance of an army of fire watchers and guards is also necessary to keep round the clock vigil during fire season.

In the past the practice of control burning forest areas well in advance of the fire season, which is normally from 15th of March to 15th of June, had been extensively relied upon to reduce fire hazard in chir pine forests. In control burning, leaf litter accumulated on the surface is burnt under control during winter and spring, when the forests are not so inflammable. After successful control burning practically no or very little leaf litter or debris is left in the forest to catch any accidental fire in summer months. Even if there is a fire there is very

little material to burn and no damage is caused to the forest. But the art or should we say the science of control burning is not practised properly and efficiently now-a-days. This important operation is entrusted to untrained fire watchers and thus this otherwise useful technique of fire protection is utterly neglected. Either it is a half-baked effort not commensurate with the expenditure incurred or is carried out so negligently that the fire becomes out of control and burns the very forest for whose protection it was meant. Control burning is an effective tool for fire protection and unless performed carefully it can also prove a dangerous weapon.

In good old days there was a proverb that 'fire is a good servant but a bad master'. But this sweet dictum does not hold good now. In the changed scenario neither the fire remains under control nor the servants are any more loyal. The fire must not be allowed to play the role of a servant, least not of a master. Gone are the days when control burning was meticulously carried out to the best advantage of the forest. But now-a-days it is an alibi to the grand old practice. Let us, therefore, do away with the so called control burning and concentrate on removal of leaf litter/pine needles which is the bane of forest fires. The expenditure incurred on removal of leaf litter from the surface of the forest will be far less than the losses incurred due to forest fires.

It is customary for the villagers to remove pine needles from the nearby forest. But huge quantity of leaf litter remains lying in the far flung areas, only to accumulate and thus create explosive situation. This leaf litter needs to be removed and put to better use, such as making charcoal bricks/cubes or wood wool. Some commercial concerns may be asked to venture this proposition. If no one comes forward, then the leaf litter should be removed by employing casual labour and dumped and burnt in safe nullahs. The expenditure thus incurred will be far less than the losses suffered due to fires. This author in the revision of the working plan of Badrinath Forest Division, in 1982-83, had suggested removal of pine leaf litter by employing casual labour. But then who reads the working plan?

The incidence of forest fires is high in India, especially in hills of Kumaun, Garhwal and Himachal Pradesh. It is also high in United States. But the fire service in U.S. is very efficient. There are 17000 fire fighters and 400 smoke jumpers to combat forest fires. Moreover

they make extensive use of aircrafts and helicopters, for putting out forest fires. In India we cannot afford this luxury. New Zealand claims that their fire service is the best in the world. They have a separate fire service for dealing with forest fires. In 1976 one Bill Cinbig Butcher of New Zealand Forest Service came to India on a mission to help India combat forest fires. He visited the forests of Dehra Dun, Saharanpur, Bijnor and Tehri Garhwal districts in the month of May, supposed to be peak fire season. After inspecting the forests of Tehri division, he came to the conclusion that the fire fighting devices he wanted to suggest for combating forest fires, cannot just work in these steep hills and deep narrow valleys. Spraying chemically treated water and liquid carbon-di-oxide from helicopter or light aircraft will be infructuous as the air-craft will have to fly at great heights and water thus sprayed from it will simply get lost without touching the fire. The use of helicopter and light air-craft can to some extent be made in the plains forests. The efficacy of modern fire fighting equipment will remain doubtful in the forests of India, particularly in the hills due to steep and rugged topography.

In the absence of efficient and sophisticated methods of fire fighting, the traditional method of beating forest fires with the help of brushwood brooms (jhampa) will remain in vogue in India, without yielding tangible results. There will, therefore, be a long wait for the rains to come and put out the fire or let it die out when nothing more is left for burning.

Fire fighting is a cumbersome and risky business. Several lives are lost in fire fighting every year. It is better to take preventive measures than hazard the risk of fire fighting. The old system of fire lines should be revived, roads, paths etc. should be kept clean of leaf litter and round the clock vigil maintained during the fire season. And above all the local people will have to be educated and taken into confidence. The preventive measures act as an effective vaccine that wards off the epidemic of forest fires which take heavy toll of our forests, its flora and fauna. Let us ponder over it.

THE INDIAN DESERT ECOSYSTEM : SOME VITAL PROBLEMS AND REMEDIES

Yogender Singh and M.M. Saxena*

The Indian desert is one of the major hot sandy deserts in the world. Moreover, it is most highly populated desert. It extends between $68^{\circ} 05'$ to $75^{\circ} 45'$ E Longitude and $22^{\circ} 30'$ to $32^{\circ} 05'$ N Latitude and constitutes the western border of India. The major part of the Indian desert is present in the state of Rajasthan. However, some of it also extends to the states of Punjab, Harayana and Gujarat. The area is characterised by low rainfall, high evapotranspiration rate, intense solar radiation, wide diurnal and seasonal thermal variations, strong dry winds particularly during summer months, general scarcity of food and forage, low quality and limited water resources—both surface and ground, and desert adapted flora and fauna. Not only plants and animals but human life too is accordingly adapted for the harsh arid conditions.

All geographical regions have their specific problems, particularly in respect of amount, distribution and utilization of natural resources. It needs no mention that right management of natural resources is the primary step to achieve the socio-economic growth. The Indian desert is one such geographical region where there is a general dearth of natural resources. That is why the area is regarded as the land of scarcity. Since it is one of the most highly populated deserts in the world, the pressure on limited natural resources has further intensified the problem of environmental degradation. Of the various environmental problems being faced and emerging freshly, following may be regarded as the most alarming ones.

Desertification :

Desertification implies the expansion of deserts over fertile lands. There have been contradictory claims over the expansion, contained or

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reducing state of desert world over by different agencies and Indian desert is no exception to it. Many factors are set responsible for the phenomenon of desertification including denudation of vegetative cover, soil erosion and march of sand dunes. At the same time various measures are suggested to combat desertification like strip cropping, sand-dune stabilization, soil conservation and transforming fallow land into arable land. Since deserts are unique ecosystems in itself having characteristic life form, these need to be conserved in their pristine form. However, their march must be checked to avoid economic losses.

Poor Status of Water :

Water is both qualitatively and quantitatively poor natural resource in the Indian desert and is the most significant limiting factor for growth and development in modern context. Surface as well as ground water are in general saline, hard and some with nitrate and fluoride levels beyond the permissible limit. Surface water sources are mostly temporary lasting hardly for six months or so in the year, while ground water table is increasingly low. People specially women and children are still to walk kilometres together to fetch a pail of drinking water in many remote interior parts in this region. With the transformation in the lifestyle, the conventional water storage systems have been badly ignored both in urban and rural areas. Need is to restore such storage systems and to educate people to understand the value of this vital resource and to minimise its wastage. Chemical surveillance of drinking water, particularly from viewpoint of nitrate and fluoride is of great significance to apply corrective measures. Use of water in activities like development of huge lawns, swimming pools, water parks etc. need to be avoided in the region.

Insufficiency of Food :

Food and forage are both scarce in the desert. Frequent droughts year after year further make the situation more grave. Basically the desert region has an animal husbandry based economy. In the want of sufficient fodder, ranchers have to either dispose of their livestock

for meat and other purposes at throw-away prices or to take it to nearby greener areas of Malwa and Gujarat during drought years. Scarcity of food for man forces him to resort to less nutritive food alternatives leading to malnutrition and associated problems like anaemia, protein deficiency, rickets and night blindness.

In order to cope with the problem of forage and fodder scarcity, due emphasis should be laid to pasture management and provision of storage depots for cattle feed and fodder. Local food produce including vegetables like Sangri, Ker, Kumatia, Ber, Matira, Millet, legumes and dairy products should maximally be consumed locally rather than exporting it to other parts of the country for economic gain. Traditional food preservation techniques need to be more popularised in the region. Special supply system should be developed in the region so as to ensure nutrition and health to all at nominal cost.

Biodiversity :

Deserts being characteristic ecosystems in respect of their physical and physiographical features hold a characteristic biodiversity. Though thin and less diverse, both flora and fauna are characteristic in this region and are evolved over ages to adapt to the available severely hostile conditions. Because of increased human pressure some of the arid zone species have already disappeared and many more are on the verge of extinction. The situation has become more grim with the introduction of canal waters in the area bringing about radical climatological and physical changes responsible for transformation of biodiversity in the region. This has not only adversely affected local flora and fauna but has introduced many new exotic forms which in times to come may threaten local species by means of competition, predation, parasitism and acting as pest and vectors of diseases. Need is, therefore, to conserve local species and to stringently carry out environmental impact assessment of the canal irrigation and altered landuse patterns in the region.

Education is the most vital tool in transforming the society. Various socio-economic goals cannot be achieved without proper public awareness of the issues. The education curriculum should be framed taking into consideration the local needs and problems. As such to inculcate environmental awareness and to motivate people's participation, it is necessary that the topics relating to above thrust problems of the desert region be introduced in curriculum at school and post-school levels. At the same time it is necessary to develop awareness packages for out of school children and illiterate society. Further, the model for socio-economic development of the region should be drawn taking into consideration the local problems, availability of natural resources and environmental conservation.

FIRST CONFIRMED RECORD: DISCOVERY OF TAKIN *BUDORCAS TAXICOLOR* IN SIKKIM

Chhezung Lachungpa SFS, D.F.O. (Wildlife)*

The Takin *Budorcas taxicolor* Hodgson is practically unknown in the Sikkam Himalayas. It is recorded further east in Bhutan and Arunachal Pradesh. Takin is a goat-antelope, a group which includes Serow (Nep. 'Thar') and Goral (Nep. 'Ghoral') as well. All three are found in the Himalayas. Of the three goat-antelopes found in the country, all three now have confirmed existence in Sikkim.

Takin is a rare and highly endangered animal. It is a protected species and listed in Schedule I of the Wildlife (Protection) Act, 1972, which is in force in Sikkim since 1976. Takin is heavily built with stout limbs and a curved profile distinctly reminiscent of the African Gnu. Its horns are also curved in much the same way as those of the African Wildebeest.

In the past Takin was reported from Sebo-Dombang conifer forest (c. 3030 m-3636 m) in 1919 in the months of August-September. In July 1976 it was seen by the villagers at Lema, Lachung in north Sikkim. Apparently the animal came from Nimphu along the Thangkar La Range, crossed over Lachung Chu to ascend the grassy hills facing east of Lema valley (c. 2121 m-2727 m).

In 1984 Late Mr. Jorgay Lachungpa, Mali, Apple Orchard, reported 'Tarkin' from Shingzakmo Reserve Forest ridge between Dombang and Shinba. During the December 1993 All India Tiger Census, the author sighted a gaur-like animal on a small flat land above a steep waterfall in Menmoitso Reserve Forest (c. 2424 m-2727 m) at a distance of around 500 m. Disturbed by our presence the animal disappeared into the bamboo forest but not before a photograph was taken of its retreat. The long distance not very good photograph was reminiscent of Gaur. Again last year in July 1998 Takin reportedly appeared above the small hamlet of Khedum (c. 1818 m-2121 m) in Lachung valley. Due to lack of proper observation and photographic evidence none of these reports could be substantiated.

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On 15 June 1999, Secretary Forests/CWLW received a wireless message from Mr. Bishnu Kumar Sharma, Supervisor of Kyongnosla Alpine Sanctuary, East Sikkim, about the appearance of a large unknown animal at 17 Mile Maundla (Menla) Reserve Forest. He informed the author that very evening. It was already too late to start so the author along with the AWLW Kyongnosla proceeded early next morning at 0430 hrs to reach around 0600 hrs. There the Wildlife Guard Mr. Naku Lepcha, Supervisor Bishnu and the police personnel narrated excitedly that the animal at a distance looked like a brown bear but at closer range appeared to be yak-like. The villagers of Kyongnosla having never witnessed such an animal in the past were confused until the author showed them the plate featuring the drawing of the Takin in 'The Book of Indian Animals' by S.H. Prater. On seeing it the assemblage of villagers and Government servants immediately and enthusiastically identified the mystery animal as the Takin.

At 0730 hrs the three of us proceeded towards Maundla and descended Rongchu valley to where the animal was last seen. We traced the hoof marks along Rongchu river and in through the eroded landscape. We returned to Kyongnosla log hut as the animal reportedly usually appeared after 1000 hrs. At around 0930 hrs we returned and waited behind a boulder. Suddenly at 1015 hrs a Takin appeared from the Rhododendron bushes and stood under a silver fir tree for nearly twenty minutes. It was an adult male. It then walked about 2 m, gazed across the river and browsed on the shrubs for 15 to 20 minutes. As it walked along a path towards the river its bulky body looked like that of a bear. It raised its muzzle and smelt the air. Suddenly it noticed the watching crowd on the road across the river and turned back into the forest. After about 30 minutes the animal was located resting under a huge silver fir tree at a distance of 500-600 m. It slept for two full hours, then woke up, shook its body vigorously and moved in semi circles around the tree trunk. Finally it came along the trail towards us and halted to graze at a distance of 200-300 m. It then descended towards the river to a bushy Rhododendron on which it brushed its sharp horns. It seemed to be sharpening its horns on the bark of the small tree. Then it took almost 45 minutes to reach the river bank. As soon

as the animal came near the river the author took a series of photographs of its different postures.

The Takin had golden brown fur on the back which ran into black on the lower flanks. A black rope-like stripe ran along the dorsal region upto the short tail. Its forelimbs were solid and robust covered with long hair. The flanks were covered with black hair but inner portion of the thighs were brown in colour. Its face was black but region between horns and forehead was golden brown. Its horns were curved at the base and pointed backwards showing pointed and sharp tips. When the animal tried to cross the river it sensed our presence and was disturbed. The field staff informed that the animal crossed the river the previous evening. It appears that the Takin had been making continuous efforts to cross the river to where domestic cattle were grazing below 17 Mile Army Camp. On observing the general behaviour of the animal and its persistence, it looked like the animal was under great stress. It looked clumsy, stubborn and hardly scared by the presence of livestock and human beings. Often it struck aggressive postures on sensing human presence.

Suddenly weather changed and it became foggy and drizzly. The Takin was last seen strolling in the mixed conifer-Rhododendron-bamboo forest. The police personnel, army units and civilians in the area were alerted about the presence of this rare and highly endangered goat-antelope and asked to lookout for its safety. This animal is worshipped by some locals in north Sikkim. They believe that the animal belongs to the deities (Shipdak) of the great hills, rivers and mountains. It is believed that killing of this animal will bring unprecedented natural catastrophe and ill luck.

The rich verdant forests of Rachela, Pangolakha, Rigu, Phadamchen, Zuluk, Budha, Kheding, Assam Lingzey, Busuk, Menla, Yali and Lagyap all in east Sikkim have remained as an almost intact virgin forest tract, thanks to the non-existence of a motorable road.

Presence of a lone Takin raises questions. Is this the same single animal that has been sighted over the years? Is this the last Takin isolated on this side of the Chola range?

BIRDS FOR CONSERVATION—LARGE GREY BABBLER

(*TURDOIDES MALCOLMI*)

By

A.M.K. Bharos*

It was not a matter of surprise to find name of Large Grey Babbler in the list of such birds which need conservation as published in brochure issued by the Birdwatchers Society of Andhra Pradesh. The noticeable point is that the species has been described as common in Deccan plateau and that now it needs protection. It is difficult to analyse the reasons for depletion in its population from here, but one of the major factors which might lead the species to the same fate in Chhattisgarh region is its intensive trapping. These trapped birds are commonly served in road side hotels as quails. An instance quoted below will be sufficient to elucidate the matter.

One acquainted person brought a bagful of quails on 26 December 1998. On examination to our astonishment, the bag contained Large Grey Babblers. These so called quails had wings broken, tail feathers pulled out and used for tying their legs together. Birds were photographed (copies enclosed) before release in nearby bushes.

On investigation it was found that the centre of this trade is located at Simga a small town and Block HQ situated at 44 Kms. on Raipur-Bilaspur road. The birds are trapped by locals known as Shikaris from nearby villages and sold on road sides and road side hotels which serve them as quails to ignorant customers. Several other species e.g. stilts, sandpipers, other waders, mynas, crows are served as partridges and quails where as Egrets and Herons are substituted for chicken.

Such trade might be going on at other places as well. It is high time that concerned authorities take notice of the situation and initiate appropriate action against the Shikaris so that the species could be saved and customers too are not deceived.

*President, CWLS, Raipur, M.P.

BIRDWATCHERS' SOCIETY OF ANDHRA PRADESH

WASH 2000
(Wildlife Art Show 2000)

As we enter the new millennium, the state of our environment is attracting greater attention from a world that realizes that the health of the people inhabiting this earth hinges on the health of the environment. Life forms, primarily wildlife, have been used since ages as the litmus for a healthy environment. The visual impact of our wildlife has often been conveyed through the medium of photography and cinematography, but wildlife art has been left behind. It is still in its infancy in India.

To promote wildlife art and provide an impetus to wildlife artists of the country, the Birdwatchers' Society of Andhra Pradesh is planning to hold an exhibition of wildlife paintings from 14-16 January 2000 in Hyderabad along with a workshop (17 January 2000) for participating artists that will be conducted by a reputed wildlife painter or illustrator.

The purpose is to provide the citizens of Hyderabad access to wildlife through paintings, further encourage and underscore the need for conservation and also provide encouragement to wildlife artists. The workshop is also intended to serve as a platform for wildlife artists to exchange ideas and learn from each other.

The exhibition will display 3 paintings each of 10 artists, selected by the organizers on the basis of 5 works that must be submitted before 7th November 1999 to the address given below.

Artists who are keen to participate should contact Honorary Secretary, Birdwatchers' Society of Andhra Pradesh, PO Box 45, Banjara Hills, Hyderabad 500034 at the earliest.

Phone : 040-3350683 (Assheesh Pittie).

E-mail : aasheesh@vsnl.net.in.

KNOW YOUR WILDLIFE

SWAMP DEER (*Cervus duvauceli* G. Cuvier 1835.) known as Barasingha is found in India in three isolated groups. The northern Terai swamp deer *Cervus duvauceli duvauceli* is found in the terai swamps of Dudhwa National Park in U.P. The other sub-species, *Cervus duvauceli ranjitsingi* is found in the swamps of Kaziranga and Manas in Assam. The third one *Cervus duvauceli branderi* inhabits Central Indian forest tracts.

DISTRIBUTION : In India the swamp deer is found in the swamps of the terai region of Uttar Pradesh, Madhya Pradesh, Assam and Sunderbans in West Bengal.

HABIT AND HABITAT : Though barasingha has adapted to hard ground conditions, yet it prefers swamps and marshy places, often spending time standing in water. It also wades in water frequently, in dipping its muzzle to feed on the aquatic plants. The males wallow in shallow muddy ponds during the rutting period in winter.

It mainly feeds on reeds, kans (*Saccharum spontaneum*), plants of the swamps, grass, herbs, leaves and buds. When it enters the cultivated fields it eats the rice plants. Barasingha exhibits seasonal movements within the habitat. During monsoon these animals move away from the swamps and grassy chauras to dense forests, interspersed with grassy clearings. During spring and summer males live solitary life, while females live in small groups. After the rutting season the stags usually form bachelor herds. In November these animals again appear in the open meadows along with their young fawns and live in larger mixed herds. Rutting takes place in winter months. In barasingha the sense of smell is highly developed and the mating call is very melodious.

DISTINCTIVE CHARACTERS : Swamp deer are slightly smaller than sambar both in size and weight. They are also less elegant than sambar. Its summer coat is gorgeous amber to golden brown with pale spots. It has firm water repellent hairs and wide spreadable toes which enable it to live in swamps. Only the male has antlers. The antlers are about a metre long, which are very beautiful and elegant.

PRESENT STATUS : The swamp deer in the past occurred in sub-Himalayan region, Indo-Gangetic plains from Pakistan to Sunderbans in the east and throughout the area between Ganga and Godavari rivers. To-day as a result of habitat destruction, predation and hunting its population has sharply declined and hence the species is endangered and included in Schedule I of the Indian Wildlife (Protection) Act.



Herd of Swamp deer (*Cervus duvauceli*).



Male Hog deer (*Axis porcinus*).



Large Grey Babblers being trapped and sold to road side hotels as quails. (See article on page 64).

HOG DEER : (*Axis porcinus*, Zimmerman-1777). The animal is relative to the Cheetal but is smaller and stouter in built. The name is probably derived from the somewhat pig like appearance of the animal and its movement, as it keeps its head down when running and not the bounding action so characteristic of the deer.

DISTRIBUTION : Hog deer is found in the plains of north India, extending from Sind and Punjab to Assam and further east to Myanmar and Tenasserim. It is absent in the the Indian Peninsula but occurs in certain parts of Sri Lanka. The deer is common in sub-Himalayan tract, particularly in terai-jungles.

HABIT AND HABITAT : It lives in the grassy jungles near the banks of rivers and nalas, grass covered delta islands and upon grassy plains where the grass is not too tall and also in scrub jungle. Ordinarily they will be found grazing not far from cover. They come around the edges of open spaces in the early morning or late evenings.

It is solitary but sometimes form small parties of two or three animals. In Assam they have been seen in larger group of 18-20 animals. This deer sometimes inter-breed with cheetal and stag is often found grazing with these animals.

DISTINCTIVE CHARACTERS : As the name suggests the hog deer has a pig like appearance and movement. The body is long and the legs are relatively short. Old stags are brown in colour with a yellowish or reddish tinge. They are distinguished by their dark colouring. The white tips on the hair gives the coat a spotted appearance. The under-parts of the body are paler and the inside of the ear and underside of the tail are white. Youngs are spotted.

The antlers are somewhat like those of the cheetal and measure 16"-20" in length, set on 1"-2" long bony pedicles. The sight, smell and hearing of the hog deer are acute. They have a habit of standing for a brief moment after going a short distance.

As is the case with barking deer the stags of hog deer can be called up by blowing on a thin glabrous leaf between the fingers. Sometimes a prowling panther is attracted by the sound which if skillfully rendered resembles the cry of a small deer in distress.

PRESENT STATUS: The species has become rarer these days because of trapping and killing of these animals for meat and skin. It is now included in Schedule III of the Indian Wildlife (Protection) Act.

R.K. DR. RANJIT BHARGAVA, A PROFILE :

Dr. Ranjit Bhargava was born to Raja Ram Kumar Bhargava of the illustrious family of Munshi Nawal Kishore of Lucknow. Recently he has been awarded the "Order of the Golden Ark" by Prince Bernhard of Netherlands, on November 28, 1998. In addition to this he has many awards and achievements to his credit. The Wildlife Preservation Society takes great pleasure in felicitating Dr. Bhargava. Following is a short profile of Dr. Bhargava.

Educational Attainments :

B.A. (Hons), M.A. (Political Science 1st Class 1st with two Gold Medals 1967), Ph.D. (Role of India's Border States in her internal, External and Defence Policies 1973), Diploma in Foreign Affairs and Diplomacy 1969; was teaching in the Lucknow University, Department of Political Science from 1970 to 1979. Has over 50 published articles on environment in various Journals/Magazines and has delivered numerous talks to Government officials on environment. Has published articles and poems in "Dharohar" (in Hindi) (1995), (with a foreward by Shri Atal Behari Vajpayee).

Field of Activity (Voluntary) :

Social work, preservation of the natural and cultural heritage of India and promotion of India's goodwill abroad. For 20 years has dedicatedly worked for preservation of environment and wildlife in all their facets, in Uttar Pradesh.

Awards :

- (1) "The German Order of Merit" (1980) from the President of Germany for promotion of Indo-German cultural goodwill.
- (2) "Order of the Golden Ark" (1998) from the prince of the Netherlands for contribution to conservation of nature.

Positions held in Non-Governmental Organisations :

1. Chairman, world wide fund for nature (WWF)—India U.P. State Committee (1988-98).
2. State Convener, Indian National Trust for art and cultural heritage (Intach) U.P. (1991-98) (was co-convener 1988-91).
3. Member, Governing Council, Intach (1992-95).
4. President, Indo-German Cultural Society U.P. (1971-80).
5. President, Indo-Arab Friendship Society, Lucknow (1976-79).
6. Convenor, Forum for International Affairs, Lucknow (1974-79).
7. President, Avadh Environment Association (1984-88).
8. President, Nainital Mountaineering Club (Lucknow Branch, (1976-79).
9. Trustee, Friends of Vrindavan (London) (from 1996).
10. President, Youth and Students Council, U.P. (1965-68).
11. Prime Minister, Lucknow University Parliament (1964-65).
12. Member, Lucknow University Proctorial Board (1966-67).
13. Vice Chairman, Bharat Yuvak Samaj, Lucknow (1966-67).
14. General Secretary, Gandhi Memorial Libraries U.P. (1972).
Has Established Munshi Newal Kishore Sections in Libraries of the University of Foreign Studies, Tokyo (Japan), the South Asia Institute, University of Heidelberg and University of Tubingen (Germany) (from 1973 to 1998).

Advisory Role in Government Set-Up :

1. Hon'y. Advisor for Environment, Army Central Command (from 1993).
2. Member, Uttranchal Department Policy Planning Cell (from 1998).

3. Member, Uttarakhand Development Council (1996-98).
4. Member, U.P. Heritage Zone Task Force (1995-98).
5. Member, Committee for Reconstruction, Development and Environment of Mathura-Vrindavan-Goverdhan (1996-97).
6. Member, U.P. Tiger Protection Committee (from 1996).
7. Member, Science Programmes Advisory Committee, All India Radio, Lucknow (1990-96).
8. Member, Nainital Lake Conservation Board (from 1998) Under National Lake Conservation Plan.
9. Member, U.P. Pollution Control Board (1991-96).
10. Member, U.P. State Wildlife Advisory Board (1977-81) and (1989-90).
11. Hony. Wildlife Warden, Lucknow (1978-91).
12. Member, J.P. State Board for Environment and Ecology (1986).
13. Member, U.P. State Environment Committee (1988-89).
14. Member, Vrajbhoomi Conservation and Development Committee (1991).
15. Member, U.P. Drought Relief Committee (1967).

Address :

1. Newal Kishore Estate
75, Hazratganj,
Lucknow-226001.
Ph. : 225190, 229067

2. The Hive
Ayarpata
Nainital—263001
Ph. : 35713

Dr. Ranjit Bhargava's work for Environmental Conservation

For the past over 20 years Dr. Ranjit Bhargava has been engaged in promoting the Ecological betterment of Uttar Pradesh; and sometimes his activities have had an impact beyond Uttar Pradesh. His main range of activities can be subdivided as under :

1. Environmental Law :

He has strived hard for the updating and proper usage of the following laws :

- (a) His efforts were mainly responsible for deletion of Section 24 (2) of "The Environment Protection Act (1986)". This sub-section was defeating the very purpose of this act.
- (b) In urban Uttar Pradesh there is no law to protect green trees from felling, since 1988, he has been striving for such a law; to which the Government has finally agreed and the law is in force from 1-12-1991.
- (c) The U.P. Parks, Playgrounds and Open Spaces Act, 1975", "The Wildlife (Protection) Act, 1972", "The Public Liability Insurance Act (1991)" etc., have been better implemented and updated as a result of the efforts of the WWF-State Committee under his Chairmanship; at various levels.

2. Wild Life :

As Chairman UP-WWF State Committee (1988-98) he has rendered good services to the protection/expansion of the Corbett National Park, Rajaji National Park, Dudhwa National Park, Kaimur Sanctuary, Katarniaghat Sanctuary, Hastinapur Sanctuary, Pilibhit Forests etc.; and the concept of Project Tiger Reserves in U.P. and Bihar for the future.

- (b) His most impressive gain had been the formation of the Tiger Protection Committee U.P. under the Chairmanship of the Governor in 1996 (Uttar Pradesh was under Governor's rule). The Committee, the first of its type in Asia, has chalked out and partly implemented a multipronged strategy to "Save the Tiger". The 1st "JANPANCHAYAT" to save the Tiger was organised by Dr. Bhargava at Pallia (near Dudhwa National Park) on 28.2.1997. This is the first effort of its type in India, and was followed by Similar Panchayats in different areas.

(c) He has also, through the U.P. -WWF Committee, worked hard for the protection of Musk Deer, Elephant, Swamp Deer, Black Bulk, Mahaseer Fish, Birds, herbs and flora of large variety. In 1990, during a personal visit to France, he detected illegal usage of Musk by the famous Fragonard factory near Nice in France. The musk illegally smuggled from India, stirred a hornets nest in the world debate to protect Wild Life in 1990.

3. **Himalayan Region :** (Uttarakhand)

He has made efforts for the betterment of the environment and ecology of the U.P. Himalayas, both in the Kumaon and the Garhwal regions, and has chalked out strategies and plans for the entire area including its townships and lakes which have been accepted by the Union and State governments. He has worked in close co-operation with the Kumaon administration, especially on the Nainital Lake Action plan and with a concrete plan accepted under the National Lake Conservation Plan of the Union Environment Ministry in 1998, he has been appointed Member, Nainital Lake Conservation Board (1998). His effort was also responsible for the establishment of the Pithoragarh Eco-task Force. His suggestion to get two more companies for this Task force (INF BN 130-Ecological Kumaon) has received the whole hearted backing of the Uttar Pradesh Government, which has forwarded the same for partial funding to the Union Forest Ministry. In 1995 he was the first to impress the Union Government about the seriousness of Forest Fires in Uttarakhand.

In 1997 as a member of the Uttarakhand Development Council he had proposed to the Planning Commission of India a "Environment Package" to be incorporated in the Ninth Five Year Plan.

4. **Urban Habitat :** He has fought a relentless battle to improve the Urban habitat especially in Lucknow, Brajbhoomi, Naimisharanya, Meerut and Nainital. He is noted for the role he played in highlighting the Pollution of the Gomti river etc as a member of the U.P. Pollution Control Board in 1995. As Convenor, INTACH-U.P. an impressive gain was to get Heritage Zone concept actively

implemented in the town planning process of Lucknow and to protect the Lucknow Zoo from being shifted from the city. He has worked hard for the cultural revival of Brajbhoomi and Naimisharanya.

5. Pollution Control: He has had a very active role in activating Government control on all sorts of pollution in U.P.; especially with reference to Sonbhadra (which was amongst the 16 Pollution hotspots declared by the Government of India, mainly by his efforts); Meerut and Gajraula. The Ganga Action Plan; the Yamuna Action Plan and World focus on the miserable condition of Gomti river; have been of interest in his work. As a member of the Pollution Control Board U.P. he took a notable lead in giving new directions to the reduction and control of air, water and land pollution in U.P. and for protection of wildlife, forests and Historic Monuments from adverse effects of Pollution.

6. Assistance to Army: From 1991 onwards he has been working to chalk out and implement the Environment Action Plan in the Army Central Command, which consists of U.P., M.P., Bihar and Orissa. He is a force behind the preparation of the 3 year army ecological plan released on 15 July, 1995. He has been instrumental in solving pollution control and environmental betterment issues in the Command (1991-98). His role has been appreciated in the Army.

7. Public Awareness: By organising the concept of "PARYAVARAN PANCHAYATS" all over the State through INTACH, WWF and the Administration, he has provided a new direction to "environment as a peoples programme". His constant interaction with the press, Radio TV and World Media has helped this cause. He has over fifty published articles (especially meant for neo-literates) on environment. His activities for environment have received a large Media coverage in Uttar Pradesh for twenty years now. He has also delivered several lectures on environment to Government officials at IMDUP Lucknow etc.

बिहार के गुमला और लोहरदगा जिलों के वन और वन्य स्तनपायी पशुओं की स्थिति का सर्वेक्षण

डा० यदुनाथ प्रसाद सिन्हा

जीव जन्तुओं के सर्वेक्षण (5 मार्च से 19 मार्च 1997) के क्रम में गुमला और लोहरदगा जिला के वन और वन्य स्तनपायी पशुओं की स्थिति का जायजा लिया गया है जो इस प्रकार है।

आज का गुमला और लोहरदगा जिला, पुराने राँची जिले का पश्चिमी भाग है जो करीब $22^{\circ}42''$ से $23^{\circ}35''$ उत्तरी अक्षांतर और $84^{\circ}0''$ से $85^{\circ}6''$ पूर्वी देशान्तर के बीच स्थित है। इन दोनों जिलों का क्षेत्रफल 10317.139 वर्ग किलोमीटर है। लोहरदगा जिला गुमला जिला के ठीक उत्तर में पड़ता है (मानचित्र)। इस विशाल भाग के उत्तर में पलामू जिला, पूरब में राँची और पश्चिमी सिंहभूम जिला, दक्षिण में उड़ीसा का उत्तरी भाग और पश्चिम में मध्य प्रदेश का पूरबी हिस्सा तथा आंशिक रूप से पलामू जिले के कुछ हिस्से पड़ते हैं।

इस बड़े भूभाग का सबसे ऊँचा पठार, चैनपुर, विष्णुपुर और लोहरदगा के पश्चिमी दिशा में शुरू होकर, अनेक गहरी घाटियों को लेकर गुमला जिला के पूर्वी भाग से होता हुआ दक्षिणी-पूर्वी भाग में चला जाता है। इसके पालकोट और लोहरदगा के बीच का भाग जंगलों से भरा हुआ है। इसकी औसत ऊँचाई 762 मीटर से ज्यादा है। इस विशाल भूखण्ड से होकर दो नदियाँ, संख और उत्तरी कोयल गुजरती है। संख नदी दक्षिण दिशा की ओर चैनपुर ब्लाक के समतल और बड़े खेती वाले मैदान से होकर दक्षिणी-पश्चिमी दिशा में गुजरती है, जबकि उत्तरी कोयल नदी दो पहाड़ियों, कुरुमगढ़ और जोरी के बीच से होकर विष्णुपुर ब्लाक के संकीर्ण घाटी से पलामू की ओर जाती हुई अन्त में रोहतास जिला के पर्वतीय क्षेत्र से होती हुई सोन नदी में गिरती है।

इस भूभाग में मार्च महीने का दैनिक औसत तापमान $30^{\circ}6$ से० और सापेक्ष आद्रता 30 प्रतिशत से 39 प्रतिशत मापे गये हैं। पिछले आँकड़े के अनुसार ग्रीष्म काल का अधिकतम तापमान 40° से० जून मास में आँका गया था। सामान्य रूप से वर्षा का आरम्भ इस क्षेत्र में जून के दूसरे सप्ताह में होता है। जुलाई और अगस्त में आकाश घने बादलों से आच्छादित रहता है और अक्सर काफी वर्षा होती है। वर्षा ऋतु सामान्यतः सितम्बर के अन्तिम सप्ताह में समाप्त हो जाती है फिर भी कभी-कभी अक्टूबर के शुरू में बहुत जोरों की वर्षा होती है। जाड़ा नवम्बर के पहले सप्ताह में आरम्भ होकर दिसम्बर और जनवरी तक काफी जोरों का हो जाता है। यहाँ तक की तापमान शून्य तक पहुँच जाता है और सुबह घास तुषार से ढकी मिलती है। फरवरी के अन्तिम सप्ताह से दिन के तापमान में वृद्धि होने लगती है और अप्रैल या मई में तापमान अधिकतम हो जाता है।

प्राचीन काल में यह क्षेत्र जंगलों और बन्य पशुओं से भरा पड़ा था। आज भी इस भाग का कुछ हिस्सा छिटपुट जंगलों से भरा पड़ा है लेकिन इन जगहों पर भी जंगल काट कर खेत, मकान तथा सड़क बनाने का क्रम जोर-शोर से चल रहा है। इन दिनों जंगल का सबसे बड़ा हिस्सा उत्तर-पश्चिम दिशा में पलामू की सीमा तक तथा पश्चिम में बरभू और खेलारी से लेकर गुमला जिला के बाहर मध्य प्रदेश के रायडीह तक फैला हुआ है।

इस क्षेत्र का जंगल शुष्क साल के नाम से जाना जाता है जिसमें साल (शोरिया रोबस्टा) जगह-जगह पर झुंड में पाया जाता है। ढलवाँ जमीन पर जहाँ साल नहीं होता उसका स्थान सलाई (बोसवेलिया सेराटा) ले लेती है। पर्वत घाटी में साल के साथ आसना (टरमिनेलिया टोमेन्टोसा), गंभार (मेलानोआर्बोरिया), केन्द (डाइओसपाइरोस टोमेन्टोसा या मेलानोक्सीलोन), सेमल (बोबेक्स मलाबारिकम), महुआ (बेसिया लैटिफोलिया), सीसम (डलवजिया सीसो) के वृक्ष भी पाये जाते हैं।

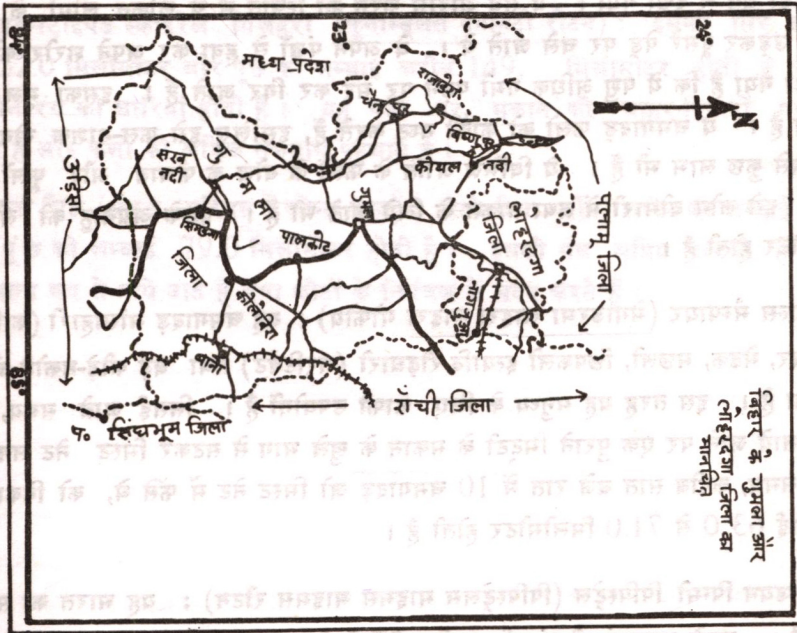
पहाड़ों पर घटिया किस्म के साल-जंगल खैर (अकोसिया कटेचू), अमलतास (कैसिया फिस्टूला) और बांस (डेनड्रोकालामस स्ट्राईकटस) इत्यादि, पाये जाते हैं। गाँव के वातावरण में आम (मैजिफेरा इंडिका), जामुन (यूजेनिया जम्बोलोना), करंज (पोंगामिया ग्लबरा), तेतर (टेमेरिडस इंडिका) बेल (एगल मारमोलेस), कटहल (आर्टोकार्पस इन्टेमीफोलिया), पीपल (कडाकस रिलीजियोसा), बड़ (फाइकस बेंगालेंसिस) इत्यादि सामान्य रूप से बागों में या मकान इत्यादि के अगल-बगल पाये जाते हैं। ताड़ (बोरासस पलाबेलिफर) का पेड़ इस क्षेत्र में कदाचित पाया जाता है लेकिन छोटे खजूर (फोयानिक्स एक्वैलिस) कहीं-कहीं छिटपुट अवस्था में पाये जाते हैं। यूकिलिप्टस स्पीसीज तथा रबड़ के पेड़ हाल ही में सामूहिक रूप से सड़क के दोनों तरफ और कहीं-कहीं विस्तार से लगाये गये हैं।

चूँकि यह क्षेत्र पश्चिम और पश्चिमोत्तर दिशा में क्रमशः मध्य प्रदेश और पलामू के घने जंगलों से मिला हुआ है, इसलिए भारतीय भैंसा या जंगल गाय (बोस गऊरस एच० स्मिथ), बाघ (पैन्थरा टिगरिस लिनीयस) तथा जंगली हाथी (एलिफस मैक्सिमस इंडिकस कूबियर) कभी-कभी भटकते हुये सीमा पार कर इन जगहों में पहुँच जाते हैं। लेकिन स्थायी रूप से यहाँ के जंगलों में नहीं पाये जाते हैं।

साँबर (सरवस यूनिक्लर नाइजर ब्लाइनबिल्ले), चीतल (अक्सिस अक्सिस अक्सिस इरक्सलेबन) तथा नील गाय (बोसेलेपस ट्रामोकमलस पल्लास) कभी-कभी जंगली तथा मंदानी भाग के खेतों या महुआ के पेड़ के नीचे, महुआ के फूलने के मौसम में दिखाई पड़ते हैं। अभी भी कुछ साँबर गुमला से करीब 75 किलोमीटर दूर उत्तर-पूरब दिशा में राजा डेरा के जंगलों में पाया जाता है। लेकिन वहाँ के लोगों का कहना है कि यह पशु विलुप्ति के कगार पर है क्योंकि बाहरी शिकारी छुपे रूप से इसका शिकार करते रहते हैं। चीतल भी बहुत कम संख्या में रह गये हैं। मंजुक हिरन या बार्किंग डियर (मुन्टियकस मूटजक भमिनलिस बेडर्ट) भी यहाँ कभी-कभी दिखाई पड़ते हैं। अभिलेख के अनुसार इन जगहों में कभी तेंदुआ (पैन्थरा पार्डस फूसक मायर) सामान्य रूप से पाया जाता था लेकिन यह भी आजकल ग्रामीणों द्वारा कभी-कभी देखे जाते हैं।

भालू (मेलरसस अरसिबस अरसिबस शाओ) फँसे हुए पथरीली जगहों पर तथा अप्रैल मास में महुआ के पेड़ के नीचे उसके फूलों को खाते हुये दिखाई पड़ता है। जंगली बिल्ली (फेलिस चाउस कुत्ता पियर्सन) भी कभी-कभी

जंगलों के बीच सड़क पार करते देखा गया है। लकड़बग्घा (हायना हायना हायना लिनीयस) अभिलेख के अनुसार यहाँ सामान्य रूप से पाया जाता है तथा मरे हुये जानवरों को कंकाल समेत खा जाता है। इस तरह यह जंगल को मरे हुये जानवरों से गन्दा होने से बचाता है। गीदड़ (कैनिस् औरियस इंडिकस हागसन) और लोमड़ी (मुल्पेस बमालेन्सिस शाओ) यहाँ हर जगह सामान्य रूप से पाये जाते हैं। साही या पोरकुपाइन (हिस्ट्रीक्स इंडिका इंडिका कर) यहाँ पके हुये उड़द (हौस बीन) और अरहर (कजनस कजन) के खेतों में तथा कभी-कभी महुआ (ब्रैसिका लैटिफोलिया) के पेड़ के नीचे जबकि महुआ का फल पक कर गिरता है, दिखाई पड़ता है।



अभिलेख के अनुसार बज्रशल्क या पेंगोलिन (मेनिस् कुसिकोडाटाग्रे) कोलेबिरा के जंगल में पाया जाता है। इसके बारे में थोड़ा यहाँ पर वर्णन करना जरूरी है क्योंकि यह जानवर लाभदायक, डरपोक तथा चींटी, दीमक इत्यादि को खाने वाला लेकिन शारीरिक बनावट से भयानक दिखने वाला है। गाँव के लोगों को इसके बारे में बहुत कम ज्ञान है, जिसकी वजह से डरावना दिखने के कारण मारा जाता है, जो बहुत ही दुखद बात है। ऐसे भी यह अब बहुत कम दिखाई पड़ता है। इसके सिर और शरीर की लंबाई करीब 485.0 मिलीमीटर और पूंछ की लंबाई 340.0 मिलीमीटर होती है। इसका संपूर्ण शरीर 11 से 13 लम्बवत कठोर शल्क की धारियों से अतिछादित रहता है। इसके मूँह में दाँत नहीं होते हैं तथा जीभ लंबी, बाहर निकली हुई और चिपचिपी होती है। इसके अगले पैर का नाखून लंबा होता है जो जमीन खोदने के काम आता है। यह जमीन पर रहने वाला जानवर है लेकिन कभी-कभी पेड़ पर भी दिखाई पड़ता है। इसकी पूंछ परिप्राही होती है।

नेवला (हरपेस्टिस इडवार्डसी न्यला होमसन) धान, गेहूँ के खेत के किनारे पर, बाँस के झुरमुट में तथा एक खेत से दूसरे खेत जाते समय सड़क पर दिखाई पड़ता है।

इसके अलावा, छोटे स्तनपायी जानवरों में एक फलभक्षी चमगादड़ (मेमा कार्डीरोप्टेरा) तीन कीट भक्षी चमगादड़ (माइको कार्डीरोप्टेरा), तीन तरह के चूहे और मूस, और एक तरह की गिलहरी (आर्डर रोडेन्विया) तथा एक प्रकाश वा छुछुन्दर (आर्डर इनसेक्टिवोरा) इस क्षेत्र में देखे तथा पकड़े गये हैं जिनका नाम अभी तक के अभिलेखों में इस क्षेत्र से नहीं मिला है। वे क्रमशः इस प्रकार हैं :—

(1) फ्लाईंग फाक्स (टेरोपास जाइगेन्टियस जाइगेन्टियस ब्रूनच) : इसका उपनिवेश बानो (बानो ब्लाक) में यूकेलिप्टस के अनेक पेड़ों पर दो हजार के करीब तथा दरा गाँव (सिसई ब्लाक) में आम और बड़ के पेड़ों पर दिन के समय कड़ी धूप में देखा गया। ये सब आराम करने की स्थिति में थे लेकिन लोगों के पहुंचने पर या फोटो लेते समय उड़कर दूसरे पेड़ पर चले जाते थे। ये अपने पंखों से हवा कर अपने शरीर को ठंडा कर रहे थे। ऐसा देखा गया है कि ये पशु अधिक गर्मी पड़ने पर मर कर गिर जाते हैं। इसका मूल कारण लू का लगना हो सकता है। ये चमगादड़ फलों को काफी नष्ट करते हैं, इसलिए इसे फल-नाशक रोग (पेस्ट) की तरह मानते हैं। इससे कुछ लाभ भी हैं। ये विभिन्न जाति के फलों के बोज के फैलाव और फूलों के परागण में मदद करते हैं। इसे लोग बीमारी में तथा ताकत के लिये खाते भी हैं। इसके अग्रबाहु की लंबाई 161.0 से 194.0 मिलीमीटर होती है।

(2) फाल्स मैम्पायर (मेगाडरमा लाइरा लाइरा गोफोय) : यह चमगादड़ माँसाहारी (कानिबोरस) होता है और चूहा, छुछुन्दर, मेढक, मछली, छिपकली इत्यादि रीढ़धारी (भरटिब्रेट) तथा बड़े कीड़े-मकोड़े जैसे टिड्डी झिगुर इत्यादि को खाता है। इस तरह यह मनुष्य के लिए काफी उपयोगी है। सिसई जाते समय, नागफेनी गाँव में लोगों द्वारा बताये जाने पर एक पुराने मिट्टी के मकान के खुले भाग से सटकर मिस्ट नेट लगाया गया तथा शाम को लौटते समय, करीब सात बजे रात में 10 चमगादड़ जो मिस्ट नेट में फँसे थे, को निकाला गया। इसके अग्रबाहु की लम्बाई 63.0 से 71.0 मिलीमीटर होती है।

(3) इण्डियन पिग्मी पिपिस्ट्रैल (पिपिस्ट्रैलस माइमस माइमस रौटन) : यह भारत का सबसे छोटा कीट भक्षी पिपिस्ट्रैल है। इसके अग्रबाहु की लंबाई करीब 27 से 29 मिलीमीटर होती है। इसे गुमला के एक खपड़ल के मकान से संघा समय मिस्ट नेट की सहायता से 4 की संख्या में पकड़ा गया। यह चमगादड़ भी कीड़े-मकोड़ों के नियन्त्रण में मदद करता है।

(4) ग्रेटर एलो बंट (स्कोटोफिलस हिथी हिथी हौसफिल्ड) : इसे लोहरदगा जिला के नागजुआ गाँव में एक खोखले आम के पेड़ से 9 की संख्या में मिस्ट नेट की सहायता से पकड़ा गया। ये करीब 100 की संख्या में इस पेड़ के खोंडर में थे। इस भेस्पर्टिलियोनिड बंट के अग्रबाहु की लम्बाई 60 से 64 मिलीमीटर होती है। ये बड़े, छोटे एवं कड़े कीड़े-मकोड़ों को खाते हैं और इनके नियंत्रण में मदद करते हैं।

(5) कौमन हाऊस रेंट (रेंटस रेंटस रफिसेन्स) : यह म्यूरिडी फैमली का चूहा है जो घरो और उसके आस-पास के खेतों में पाया जाता है। यह बहुत ही नुकसान देह है। ये किताब, अनाज, फसल इत्यादि का नाश करते हैं। लोग इससे बहुत परेशान रहते हैं। इसके सिर और शरीर की लंबाई करीब 164.0 मिलीमीटर और पूंछ की लंबाई 197.0 मिलीमीटर होती है।

(6) कॉमन हाऊस माऊस (मस मसक्यूलस कस्टेनियस वाटरहाऊस) : यह हर घरों में पाया जाता है। इसके सिर और शरीर की लम्बाई करीब 68.0 मिलीमीटर तथा पूंछ की लम्बाई 79.0 मिलीमीटर होती है। यह भी किताब, फोटो, अन्न और फसल इत्यादि को नुकसान पहुंचाता है, अतः मनुष्य का शत्रु है।

(7) लेसर बेंडिकूट-रेट (बेंडिकोटा बेंगालेनसिस बेंगालेनसिस ग्रे) : इसके सिर और शरीर की लम्बाई करीब 181.0 मिलीमीटर और पूंछ की लंबाई करीब 147.0 मिलीमीटर होती है। यह रसोई घरों तथा मकान के अगल बगल के खेतों तथा गोदामों में पाया जाता है।

(8) फाइव-स्ट्राइपड स्कोइरेल गिलहरी (फूनाम्बूलस पेनानटी रौटन) : इसकी सिर और शरीर की लम्बाई करीब 152.0 मिलीमीटर और पूंछ की लम्बाई करीब 149.0 मिलीमीटर होती है। खसके शरीर पर पांच हल्के पीले रंग की धारियां होती हैं। यह पेड़ों पर, मकान की चाहर-दिवारों पर तथा जमीन पर भी पाये जाते हैं और फलों को अधिक नुकसान पहुंचाते हैं।

(9) हाऊस सिऊ (संकस म्यूरिनस सेरलेन्स साब) : इसके सिर और शरीर की लम्बाई करीब 118.0 मिलीमीटर तथा पूंछ की लम्बाई 79.0 मिलीमीटर होती है। इसकी गंध अप्रिय लगती है। यह जंगलों तथा घरों में सामान्य रूप से पाये जाते हैं तथा कीटों के नियंत्रण में मदद करते हैं।

At the same time innovative ideas to improve the lot of wildlife habitats in the forests all over the country should continue to be encouraged. Some of them are :—
—Establishment of a Forest Protection Force.
—Bio-Industrial Watershed Management for removal of poverty and hence saving the forests from the pressure of poverty.
—Strengthening and improvement of institutions of the rural people.
—Bio-technology based Commercial Forestry.
—Private Forests and Wildlife Parks (run by Wildlife Societies and Private Companies).
We must combat with positive ideas, the present national mood of despair about the forests and wildlife.
Prof. J.S. Bahl,
Former Professor of Soil & Water Conservation,
IIT Kharagpur & Joint Commissioner (Soil Conservation), Govt. of India.
Nyman Vihar, Delhi-92 (Life Member of Wildlife Preservation Society of India).

FROM OUR READERS

Dear Editor,

Forests are the habitat of wildlife. Since forests appear on their way out, wildlife is bound to meet the same fate. So, our first concern should be to save the forests and the wildlife from threat of extinction. Otherwise, our biodiversity will be hit. Biodiversity is the wealth of the 21st century, on which our economic status will be founded. What can we do immediately to avert the looming threat of extinction of species? Obviously, the answer is research on breeding of wildlife species. Let us take the example of the tiger. Tiger population is decreasing to dangerous level, habitats are degraded under the population pressure and utter laxity in law enforcement. We must, therefore, start a National Tiger Breeding Research Centre. No one is happy to see the tigers in captivity. But captive breeding is better than silently watching the extinction of the tiger in India. We, the conservationists, should, therefore, try to control our 'distaste' for captive breeding and plead for such a tiger breeding centre to be established by the government with the collaboration of the NGOs like our Society.

At the same time innovative ideas to improve the lot of wildlife habitats in the forests all over the country, should continue to be encouraged. Some of them are :—

- Establishment of a Forest Protection Force.
- Bio-industrial Watershed Management for removal of poverty and hence saving the forests from the pressure of poverty.
- Strengthening and improvement of institutions of the rural people.
- Bio-technology based Commercial Forestry.
- Private Forests and Wildlife Parks (run by Wildlife Societys and Private Companies).

We must combat, with positive ideas, the present national mood of despair about the forests and wildlife.

Yours etc.

Prof. J.S. Bali,

Former Professor of Soil & Water Conservation,
IIT Kharagpur, & Joint Commissioner (Soil
Conservation) Govt. of India.

E-353, Nirman Vihar, Delhi-92 (Life Member of Wildlife
Preservation Society of India).

NEWS AND VIEWS

NEWS

Tiger census changes spots for millennium's last head count

Ajay Suri

New Delhi, May 3

The century's last census of the Indian tiger will begin later this week—it's being kicked off from the Corbett Tiger Reserve.

To make the counting more "realistic", Project Tiger has decided to opt for altogether different parameters. For one, it has asked the authorities of the 25 tiger reserves to stop relying too much on the age old technique of counting pug-marks. They have instead been asked to determine the territory of individual tigers by taking into account more variables like impression pads, sightings, fresh killings and scratch marks on tree trunks.

This method, though recommended by the Project Tiger two years ago, could never really take off due to "paucity of funds", the argument cited by each of the 14 tiger states. But the problem seems to be more or less resolved this time. Armed with Rs. 1 crore from the Ninth Plan, the Project Tiger has asked them to take the count beyond the national parks.

Project Tiger director P.K. Sen says: "The census this time will be different as it will also take into account tigers outside the reserves." According to Sen himself some 30 percent of the tigers are found outside the reserves. These tigers require more protection, hapless as they are at the mercy of poachers operating outside the national parks.

Sen candidly admits that the census would face problems in several states, and for different reasons. In Assam, he says, several militancy-riddled forest tracts would make the head count extremely difficult. In Bihar, the forest staff has not been paid for months; their dedication to the job is anybody's guess.

In MP, the census would be a big problem in the Naxalite-hit Bastar. And in the Karnataka's BRT sanctuary, poacher Veerapan will ensure that the forest staff keeps away. U.P. which has tiger sanctuaries such as Dudhwa and Corbett, may face an altogether different problem. "Its area is too large," says Sen. Sen is angry with some NGOs, who have launched an attack on the Govt for its alleged failure to protect the tiger.

"These NGOs, who have made the tiger a symbol of their own protection, have not even spent \$2 million on the tiger, whereas the Govt and the states have spent over \$200 million. But the fact remains that these NGOs have collected, even from school children, a whopping \$500 million in the name of tiger. Where has this money gone? Obviously they have eaten it up", he says.

Rapid depletion of forests worries conservationists

Satyen Mohapatra

New Delhi, March 8

The Fast-Disappearing forest cover is the single most important crisis facing conservationists today, says Dr. Claude Martin, Director General, WWF International which spends nearly \$200 million annually on conservation efforts.

Nearly half of the world's original forest has been lost. Over 60 per cent of the temperate broadleaf and mixed forest, around 30 per cent of the needleleaf forest, about 45 per cent of the tropical moist forest and approximately 70 per cent of the tropical dry forests have disappeared.

The greatest reduction has been in Asia where about 70 per cent of the original forest cover has been lost. Today intact forest tracts remain only in the Russian Federation, Canada, and the Amazon and Congo basin, according to the 1998 "Living Planet Report" of the WWF.

The world's forest cover, not counting plantations decreased by 13 per cent between 1960 and 1990 from 37 million square kilometres to 32 million square kilometres—an average annual loss of about 1,60,000 square kilometres.

Talking to *The Hindustan Times* Dr. Martin who was here to attend the Millennium Tiger Conference, said the WWF has chosen its conservation priorities as the three biomes forests, freshwater ecosystems, and oceans/coasts, he said.

The WWF Network plans to focus at least 80 per cent of its total conservation spending on the agreed conservation priorities.

Forests worldwide remain under extreme threat and therefore the WWF had a target that protected areas should at least go upto 10 per cent in every country, he added.

He said they had founded a new body called Forest Stewardship Council (FSC) for the certification of sustainable forest management. Ten million hectares had been brought under certification.

Timber products are being labelled with FSC certification to tell consumers that the timber has not been produced at the cost of forests. To secure the certificate state governments, provincial governments, timber companies had to adhere to standards, and even respect indigenous customs.

The WWF also had a major marine programme as world fishery resources faced a severe situation. A Marine Stewardship Council (MSC) has been created to provide certification for sustainable fishing.

The first certified fish products were likely to be launched sometime this year by a multi-national company.

The fish products labelled with MSC labels would tell consumers that the fish product has been produced under rigid criteria of sustainability like following a quota for fishing gear which did not cause any harm to the environment of the fishes.

रामगढ़ रेंज में पचास हजार पेड़ होपलो कीटग्रस्त

अमर उजाला ब्यूरो देहरादून 17 जून 1999

होपलो कीट (होपलो सिरिम्बक्स स्पाइनीकोरनिस) वन विभाग के लिए सिरदर्द बनता जा रहा है। रामगढ़ रेंज इससे सर्वाधिक प्रभावित है। सर्वेक्षण में अब तक पचास हजार होपलो कीट ग्रस्त पेड़ों का पता चल चुका है। इसको लेकर वन विभाग के अधिकारी खासे परेशान हैं। राजाजी नेशनल पार्क ने वन अनुसंधान संस्थान की मदद से इससे निपटने के लिए कार्ययोजना बनाई है। 'ट्रेप ट्री' नामक यह अभियान जुलाई के पहले हफ्ते से चलाया जाएगा।

सूत्रों के अनुसार होपलो कीट साल के पेड़ों को अपना निशाना बनाता है। इसे साल हार्टऊड बोरर के नाम से भी जाना जाता है। पिछले कुछ समय से यह कीट साल के वनों में तेजी से फैल रहा है। खासकर रामगढ़ रेंज में इसका प्रकोप बहुत अधिक है। सूत्रों के अनुसार जिस वन क्षेत्र में एक प्रतिशत पेड़ होपलो कीट के शिकार हों उस इलाके को महामारी की श्रेणी में रख लिया जाता है।

हाल में राजाजी नेशनल पार्क ने रामगढ़ रेंज का सर्वेक्षण कराया। सर्वेक्षण रिपोर्ट में चौंकाने वाले तथ्य सामने आए। इससे वन विभाग के अधिकारियों की नींद हराम हो गई।

सूत्रों के अनुसार सर्वेक्षण में पता चला कि रामगढ़ रेंज के दस लाख साल के पेड़ों में से लगभग पचास हजार पेड़ होपलो कीट से ग्रसित पाए गए। कुछ इलाकों में तो आठ से दस फीसदी पेड़ों पर यह कीड़ा पाया गया। जबकि पांच फीसदी से कम पेड़ तो कहीं मिले ही नहीं। सर्वेक्षण से पता चलता है कि आशारोड़ी कंपाउंड नंबर तीन वन क्षेत्र हीपलो कीट से सर्वाधिक प्रभावित है। वहां दस प्रतिशत से ज्यादा पेड़ों पर होपलो कीट पाया गया। रिपोर्ट में 44200 साल के पेड़ों में से 4600 पेड़ इससे ग्रसित पाए गए। वन विभाग के सूत्रों के अनुसार मानसून सत्र में होपलो कीट का प्रकोप तेजी से बढ़ता है। बताया जाता है कि इस दौरान होपलो कीट लार्वा छोड़ता है। एक कीट कम से कम ढाई सौ लार्वा छोड़ता है। मानसून सत्र में यह लार्वा पूरे वन क्षेत्र में फैल जाते हैं। इससे वन अधिकारियों की नींद हराम हो रखी है।

इस संबंध में राजाजी नेशनल पार्क के निदेशक सी०पी० गोयल ने बताया कि होपलो कीट से निपटने के लिए कार्ययोजना तैयार की गई है। वन अनुसंधान संस्थान के सहयोग से यह योजना क्रियान्वित की जाएगी। उन्होंने बताया कि 'ट्रेप ट्री' नामक इस अभियान के तहत कीटग्रस्त पेड़ों को काटने के बाद दोनों तरफ से ठोका जाएगा। इस तरह उसमें मौजूद होपलो कीटों को बाहर निकाला जाएगा। इन कीटों को बाद में रासायनिक पदार्थों के जरिये मार दिया जाएगा। वन अनुसंधान के विशेषज्ञ आर०एस० भंडारी के नेतृत्व में यह अभियान जुलाई के पहले हफ्ते में शुरू होगा। पहले चरण में 203 कीटग्रस्त पेड़ों को समाप्त किया जायेगा। एफ० आर० आई० ने इन पेड़ों को काटने की अनुमति मांगी है।

पार्क निदेशक ने बताया कि शेर व गुलदार की गणना का कार्य पूरा कर लिया गया है। पूरे क्षेत्र में 28 शेर व 177 गुलदार हैं। इनमें 64 नर गुलदार, 102 मादा गुलदार व 11 बच्चे हैं। सर्वाधिक गुलदार चीला रेंज में हैं। वहां 41 गुलदार व आठ शेर पाए गए। अन्य रेंजों में लगाये—रामगढ़ में तीन शेर, 12 गुलदार

कांसरों में 23 गुलदार, हरिद्वार में चार शेर, 20 गुलदार, धौलखंड में 5 शेर, 23 गुलदार, गौहरी में 3 शेर, 17 गुलदार, मोतीचूर में 1 शेर, 17 गुलदार, चिल्लावाली में 7 शेर, 24 गुलदार व गोविंद पशुबिहार पुरोला में 24 गुलदार मिले।

उन्होंने बताया कि पिछले दो सालों में दो शेर कम हुए। जबकि गुलदार की संख्या में 28 की बढ़ोतरी हुई। गणना के दौरान पता चला कि दो साल के दरम्यान शेर के दो बच्चे हुए। इसे अच्छा संकेत माना जा रहा है। श्री गोयल का मानना है कि इससे अनुमान लगाया जा रहा है कि पार्क क्षेत्र में रह रहे शेर व शेरनियों ने यहां के पर्यावरण को स्वीकार कर लिया है। पार्क निदेशक के मुताबिक हाथियों की गणना का कार्य अंतिम चरण में है। शीघ्र इसे पूरा कर लिया जाएगा।

आतंक का पर्याय बने हाथी को सैनिकों ने मार गिराया

अमर उजाला ब्यूरो महेन्द्रनगर (नेपाल) 24 जुलाई 1999

एक सप्ताह पूर्व से आरक्ष के अन्दर आतंक मचा रहे जंगली हाथी को वार्डन के आदेशानुसार सेना के जवानों ने स्वचालित राइफलों से मार गिराया।

वार्डन कार्यालय से मिली जानकारी के अनुसार शाही गुल्ला फांटा वन्य जन्तु आरक्ष में एक सप्ताह पूर्व दो व्यक्तियों को निर्ममतापूर्वक मार चुके तथा सात घर तहसनहस कर चुके जंगली हाथी को वार्डन शिवराज भट्ट के आदेशानुसार सेना के जवानों ने कल शाम पांच बजे चारों ओर से घेरकर स्वचालित चार राइफलों से 200 राउण्ड गोली दागकर मार डाला।

पालतू हाथियों को घेरकर रखे हुए तथा खाना भी न खाने दे रहा यह हाथी तीन मिनट तक लगातार गोली मारने पर भी नहीं डला। तत्पश्चात सेना के जवानों ने तीन ओर से घेरकर स्वचालित राइफलों से गोली दागी।

हाथी को नियंत्रण में लाने के लिए डाट विधि द्वारा एंटीडोज इंजेक्शन भी दिया गया तथा डराने के लिए 21 राउण्ड हवाई फायर भी किया गया था। ज्ञात हो कि उक्त हाथी ने एक सप्ताह पूर्व पिपरैया ग्राम निवासी 25 वर्षीय नाना देवी ठगुना एवं राम बहादुर बुढा को कुचलकर मार डाला था।

भारत के दुधवा नेशनल पार्क एवं नेपाल का शाही गुल्ला फांटा वन्य जन्तु आरक्ष आपस में जुड़े होने के कारण हाथी कहां का है और कहां से आया कुछ पता नहीं चल सका है। हाथी को मारने से आरक्ष के नजदीकी ग्रामवासियों में खुशी की लहर दौड़ गई।

इस बीच एक सप्ताह पूर्व आरक्ष के अन्दर जंगली हाथी द्वारा मारी गयी 25 वार्षीय नाना देवी ठगुना तथा 32 वार्षीय राम बहादुर बुढा के परिजनों को वन्य जन्तु आरक्ष द्वारा आर्थिक सहयोग दिया गया। मिली जानकारी के अनुसार वैजनाथ उपभोक्ता समूह के अध्यक्ष मृतक राम बहादुर बुढा के परिजनों को दस हजार रुपए तथा मृतक नाना देवी ठगुना के परिजनों को पांच हजार रुपए का सहयोग दिया गया। यह आर्थिक सहयोग जिलाधिकारी स्थानेश्वर देवकोटा ने परिजनों को सौंपा।

The biennial elections for the posts of office bearers and members of the Executive Committee of the Wildlife Preservation Society of India, Dehra Dun, were held in the month of June, 1999. The elections were held with ballot paper. 52.6% members exercised their votes. The response shown by the members was encouraging and bodes well for the future of the Society.

Following is the result of the elections :—

1. Shri N.D. Bachkheti, IFS (Retd.), President
11/85, Vasant Vihar, Dehra Dun-248006
2. Shri Dinesh Jain, Dinesh Bhawan, Vice President
59, Gandhi Road, Dehra Dun-248001
3. Shri N.N. Goel, Advocate, 11-A, Nemi Road, Vice President
Dehra Dun-248001
4. Shri I.S. Negi, IFS (Retd.), Honorary Secretary
12, Sewak Ashram Road, Dehra Dun-248001
5. Shri Narendra Singh, 21/2-3, Teg Bahadur Assistant Secretary
Road No. 4, Dehra Dun-248001
6. Shri Shiv Prasad, C/o Shiv Kutti, Assistant Secretary
77, Jhanda Mohalla, Dehra Dun-248001
7. Dr. S.P. Singh, 9-A, Sewak Ashram Road, Hony. Treasurer
Dehra Dun-248001
8. Ms Sumitra Rath C/o Kanishka Rath, Friend's Lady Member
Colony, Cuttack, Orissa-753001
9. Ms Reema Pande, 25, Malviya Road, Lady Member
Laxman Chowk, Dehra Dun-248001
10. Shri Apar Singh, 21, Curzon Road, Dehra Dun-248001 Member
11. Shri C.P. Naithani, IFS (Retd.), 10/1, Rajendra Nagar, Member
Street No. 1, Dehra Dun-248001
12. Shri G.S. Thaplial IFS (Retd.), 25/1, Teg Bahadur Member
Road, Lane-3, Dehra Dun-248001

13. Dr. H.S. Rose, 4149, Phase II, Urban Estate,
Patiala, Punjab-147002 Member
14. Shri H.B. Joshi, IFS (Retd.), 101/II,
Vasant Vihar, Dehra Dun-248006 Member
15. Shri J.S. Aswal, BDO (Retd.), Kailash Gate,
Rishikesh-249201 Member
16. Shri J.S. Bisht DIG, SSB (Retd.), 131, Park Road, Member
17. Air Cdr. R.S. Bishnoi, 163, Defence Colony,
Dehra Dun-248001 Member
18. Col. V.N. Mathur, 48, E.C. Road, Dehra Dun-248001 Member
19. Dr. Y.V. Jhala, Faculty Member, Wildlife Institute
of India Chandrabani, P.O. Box No. 18, Dehra Dun-248001 Member

I.S. NEGI
Honorary Secretary

DONATIONS

- 1. Dr. Shiv Prasad Kuksal, M.Sc., M.A. (Hindi), Ex. Asstt. Director, Wildlife Institute of India and Scientist-S.D. (Retd.) Forest Research Institute, Dehra Dun, has donated Rs. 5000/-, equivalent to his one month's pension, to the Prime Minister's National Defence Fund for the MARTYRS of Kargil war. The Wildlife Preservation Society of India, Dehra Dun proudly appreciates his noble and patriotic gesture and thanks him very much for this act of benevolence.**
- 2. Shri Dinesh Jain, Vice President of the Wildlife Preservation Society of India and an eminent industrialist of Dehra Dun, has kindly donated Rs. 2500/- for the purchase of 12 chairs for office use of the Society. The Society is grateful to Shri Dinesh Jain for this benevolent act.**

Honorary Secretary

Wildlife Preservation Society of India

1. The aims and objects of the Society are as follows :-

- (a) To promote interest and impart knowledge regarding the preservation and conservation of all forms of wildlife, particularly among the youth of the country.
- (b) To cooperate with the Govt. of India and State Governments and with others Societies and Institutions having similar aims and objects in working for the interests of wildlife.
- (c) To assist in enforcing and actively supporting the Forests Acts, Wild Birds and animals Protections Acts and Rules etc. of State Governments and the Indian Arms Act and Rules in so far as they pertain to wildlife and to bring to the notice of the authorities any infringement of the same and to assist in the detention and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wildlife administrators in the formation, maintenance and protection of Sanctuaries and National Parks, preservation of wildlife in general and endangered species of india in particular and in the introduction of exotic species into the country, rehabilitation of endangered species etc. and in the formulation and amendments of rules and acts, so as to conserve and increase wildlife stocks.
- (e) To raise funds for carrying out the above aims and objects and to found and maintain museums, reading rooms and libraries of natural history in order to disseminate knowledge regarding wildlife.
- (f) To carry out publicity and propaganda for the preservation of wildlife in India by means of monographs, journals, films, filmstrips and other feasible methods.
- (g) To assist members of the Society in obtaining facilities for viewing and photographing wildlife in India.
- (h) To conduct research into the problem of Wildlife management in India, and in pursuance of this, to initiate, encourage and, where possible assist in the projects for the study of threatened species and related objects and to provide reference and reserch facilities for such work.
- (i) To carry on such other activities which will serve the above subjects.

2. What membership of Wildlife Preservation Socitiey of India will entitle you to?

- (1) You will become an active member of the growing group of Wildlife enthusiasts, who enjoy working for and spreading the knowledge of how to conserve India's heritage of wildlife for posterity.
- (2) You will be entitled to the full use of the library of the Wildlife Preservation Society and of its reading room.
- (3) You will receive a membership certificate.
- (4) You will receive a personal Identification and Membership Card.
- (5) You will be entitled to buy all publications of the Society at a concessional rate.
- (6) You will be entitled to buy at concessional rates the Societies Greeting Cards, Calendars, Tie, Lapel badges and the Balance of Nature Game (specially Published in colour for its educative and recreational values).
- (7) You will be supplied "Cheetal", the quartely journal of the society free.

3. For membership particulars write to Honorary Secretary, Wildlife Preservation Society of India, 7 Astley Hall, Dehra Dun.

Wildlife Preservation Society of India

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Edited by N.D. Bachkheti, I.S. Negi, Dr. S.K. Sangal, and N.K. Jain. Published by Honorary Secretary for the Wildlife Preservation Society of India, 7, Astley Hall, Dehra Dun and Printed by M/s Dun Printing House, Dehra Dun.